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THE FOUNDRY

Vol. 22. *CLEVELAND, OHIO, JUNE, 1903.* *No. 130*

PUBLISHED MONTHLY BY
THE IRON AND STEEL PRESS CO.
ROSE BLDG., CLEVELAND, OHIO.

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PITTSBURG: 429 Park Bldg., A. O. BACKERT.
NEW YORK: 150 Nassau St., D. C. WARREN.
THE CENTRAL WEST: R. A. EVANS.

The subscription price of THE FOUNDRY is $1.00 a year to points in the United States, Canada and Mexico. To Great Britain: Eight Shillings.

Practical articles pertaining to the trade in all its branches are solicited and will be paid for.

We can begin subscriptions with the current number only.

Entered as second-class matter at the Post-Office at Cleveland, Ohio.

Trade Outlook.

A few weeks ago melters of iron were buying everything in sight that was suitable to be run into castings and the prediction was made at the time that the scarcity of melting stock would continue for several months. With better transportation facilities, supplies have gone forward with more than the usual promptness and perhaps created the impression that iron and fuel are stored in large quantities, which may be drawn upon at will. At any rate founders are again buying in very small lots, expecting that prices will ultimately be fixed on a lower basis than exists today. They are being encouraged in this by concessions already granted and the apparent anxiety of certain sellers to close contracts for the remainder of the year. It is also claimed that many founders are cancelling orders placed quite awhile ago at higher prices than now prevail, in many cases justifying this action on their part by the fact that deliveries were not made on time. Coke prices also show a falling off from the high level reached during the winter months and in several districts the blowing out of furnaces for repairs has helped to make the supply more plentiful.

While no labor disturbances of any magnitude are affecting the foundry trade there have been a number of irritating difficulties in several localities, the majority of which have been settled by mutual concessions. Advances have been secured by workers with relatively little trouble, especially where shops have been crowded with orders. Reports from all parts of the country show that foundries are well filled with work, employing the maximum number of hands and melting, if anything, more than their usual share of iron. Under such conditions there is no ground for taking a pessimistic view of the immediate future.

Handling Cupola Charges.

Our readers have perhaps all noticed in the illustrations of foundries recently appearing in these columns that nearly all of these shops have paid special attention to the handling of stock for their cupolas.

There was a time when the question of economy in the use of fuel seemed to be uppermost, but evidently shop owners are realizing that extreme saving in this direction is not as desirable as might appear at first glance, and that a reduction of costs may well be attempted along other lines. While the waste of coke in the melting of iron is not to be encouraged by any means, there has undoubtedly been a greater loss in defective castings through attempts to reduce the fuel ratio than the value of the coke saved would amount to.

The average foundry may well look to its method of handling iron and coke as a corner in which there is room for improvement. From the time these materials arrive at the plant until they are finally deposited in the cupola there is a constant rehandling of same that is extremely expensive. Even where switching facilities are what they should be it is not uncommon to find material handled three or four times. On a crowded charging platform, generally far too small for all needs, we see a gang of men weighing up charges during the progress of a heat, and often they are unable for lack of time to do this properly. A hundred

pounds too much of one kind of iron and a hundred pounds shortage of another brand will often cause enough difference in a mixture so that comment will follow, yet with the general ignorance of the class of labor employed in this part of the foundry and the speed with which charges must be gotten ready, such occurrences are not uncommon. On the whole there is no reason why a piece of pig iron should be picked up in the yard and deposited on a wheelbarrow or other conveyance and from there to the cupola scaffold, only to be transferred to the scale a few hours later, when it must again be handled before it lands in the cupola.

Taking into consideration the comparative low cost of industrial railways and car equipment for same, there is no reason why cupola charges should not be made up in the stock-yard and reach the charging platform ready for the cupola. With a low built charging door, arrangements may be made to discharge the contents of a car directly into the cupola, thus accomplishing with one handling that which often requires several. Greater uniformity in mixtures will follow the proper making up of charges, which is seldom secured on dark charging platforms, where one is unable to distinguish the figures on the scale beam. Then the saving in labor is worth looking to, and the manager of a foundry who grumbles at the amount of coke used in melting while he employs men to pick up pieces of pig iron several times, only to put them down again, will find that there are other ways of effecting economies besides holding down the fuel consumption and molders' wages.

The Stove Manufacturers' Convention.

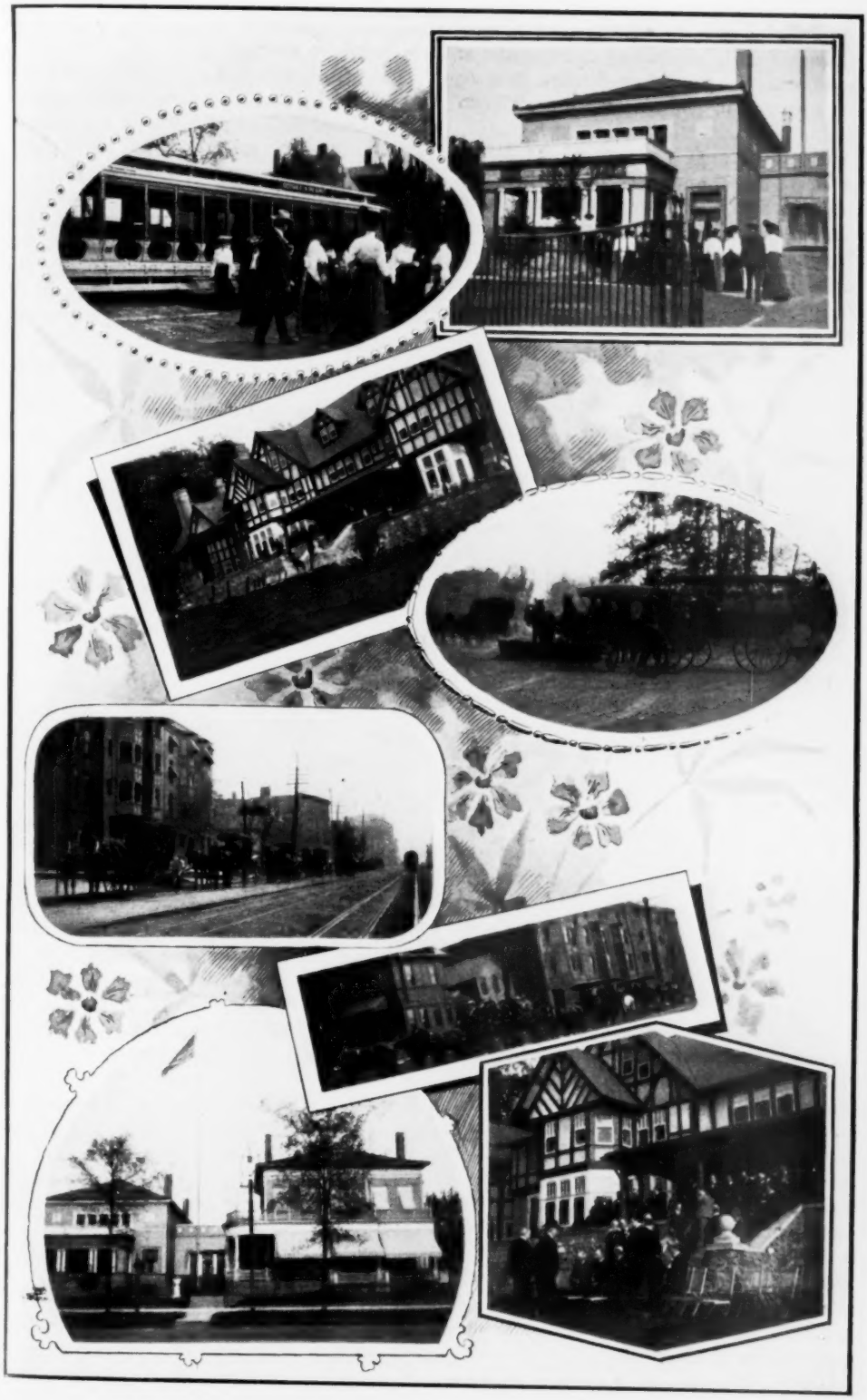
The Stove Founders' National Defense Association and the National Association of Stove Manufacturers held their convention at Cleveland, O., May 12, 13, 14. The former ranks among the most powerful and efficient of the protective associations which have been organized by manufacturers chiefly for the purpose of handling questions arising between themselves and their employes. The Stove Founders' Defense Association was formed in Cleveland in 1886 and for many years met the representatives of no labor organization outside of the Molders' Union. Recently other bodies of workmen, such as the stove mounters and polishers, have been organized and thus directly increased the work of their employers' association.

President Chauncey H. Castle, in reviewing the work of the year, stated that over two hundred cases of labor trouble had received attention during that time, and while many of these were of but little importance, they all had to be handled with a great deal of care, keeping the association's officers and committees busy. The amount of work handled by them has more than trebled during the past seven or eight years, and from present indications a further increase may be looked for. Among the unprecedented conditions which have co-operated in promoting these conditions, President Castle, in his report, calls attention to the following:

"The very largely increased membership. A larger number having joined within the two years last passed, than during any five of the other fifteen years since its organization. The immensely increased business of the country has caused large demands for labor in all departments and a tendency to agitate, to organize and unfortunately under some unwise and indiscreet leaders to be unjustly exacting. The fact that the committees of the S. N. F. D. A. have recently made agreements, as authorized by its membership, with the Stove Mounters' International Union and with the Metal Polishers' Union, each of which have brought forward many matters for consideration and adjustment.

"As the agreements made with each of the labor organizations are alike in that they provide that in event of failure of employer and employe directly interested to agree upon any question at issue, either party may have it referred to the presidents of the two organizations to which the contestants belong, who themselves, or through other delegates, as their personal representatives, must meet, consider and try to settle any issue so referred. All issues of this character settled in this manner relieve the district committees of the labor, and our association of much of the expense involved.

"The very large number of questions at issue between our organization or its members and the several organizations of workmen with whom we have agreements, herein reported, when added to the very much larger number of minor cases not reported upon, is astounding and would be thoroughly discouraging were it not that, by means of the system we have inaugurated and strictly followed, we have been



SOME ENTERTAINMENT FEATURES OF THE STOVE MANUFACTURERS CONVENTION.

able to dispose of each and every one of them in a manner fairly satisfactory to all parties at interest, without serious loss, damage, delay or expense in any individual case, through exercise of close attention and patient care.

"Such satisfactory results could not be accomplished by the officers and committees alone, no matter how active and efficient they might be, were they not supported by the interested and earnest efforts of the membership in general."

All of the officers were re-elected for the ensuing year, the list being as follows: President, Chauncey H. Castle, Quincy, Ill.; vice president, Henry Cribben, Chicago; secretary, T. J. Hogan, Chicago; treasurer, Abram C. Mott, Philadelphia, Pa.

The thirty-second annual convention of the National Association of Stove Manufacturers was called to order by President Albert N. Parlin on the morning of the 13th. In his annual address Mr. Parlin said:

"Success with us may be attained by co-operation, but never by cutting profits. We have reached, by slow degrees, reasonably profitable prices for our goods. It should be the aim of every member of this association to maintain these prices for the present year, at least. Remember, when you are tempted to make a concession, how fruitless it will be in ultimate good and how sure to react harmfully upon you and all of your competitors. During the spring and early summer, when under normal conditions we are accumulating stock and orders are few, the temptation is very great to make sales and to believe the story that the salesman brings as a reason why he did not get an order—viz., that your competitors were cutting prices. This is especially apt to be the case if we are a little short of money, and think we can make a cash sale and turn some slow stock; but the man who resists this temptation will have his reward when later the natural demand takes all his accumulated stock at full prices and his balance sheet shows him a fair return for his year's labor."

Among other things discussed was the subject of cash accounts. While the question was thoroughly considered in all its phases, no definite action was taken.

The question of cooking exhibits was also carefully discussed, the opinion of the manufacturers being, on the whole, adverse to this expensive form of advertising.

The desirability of molding machines in stove foundries was taken up, but no definite conclusions were reached.

The matter of polishing machines was discussed, but no decision was made as to whether they could be used profitably by the trade or whether the work turned out was equal to the work done by hand in the ordinary way.

The question as to whether an experienced salesman who demanded a large salary, and was ready to change at any time to the highest bidder, or the young man educated by the house, and started out on the road, was the best traveling salesman, was discussed, but no action was taken.

The question of co-operation between district associations was carefully considered by the association, and was left to the secretaries of the different district associations for further action.

A special committee was appointed to take up the question of breakage in transit.

While there was a thorough discussion on the question of packing goods for foreign shipment no resolutions on this subject were passed.

The election of officers resulted in the choice of the following:

President, Henry Cribben, of the Cribben & Sexton Co., Chicago.

First vice president, Peter B. Acker, of the Union Stove Works, Peekskill, N. Y.

Second vice president, J. W. Van Cleave, of Buck's Stove & Range Co., St. Louis.

Treasurer, Lewis Moore of the Joliet Stove Works, Joliet, Ill.

General secretary, Thomas J. Hogan, Chicago.

One of the pleasant features of the convention, as a side issue, was the smoker tendered the visitors by the Gobeille Pattern Co., at the Cleveland Yacht Club, Tuesday evening, at the close of the theater performance. The Gobeille Pattern Co. has always been noted for its original advertising ideas and the bulletin through which it called attention to its "Smoke Fest" was effective enough to draw a full house. Mr. Jos. Leon Gobeille personally declined to be held responsible for anything that happened, leaving this to certain parties whom he designated as his "wicked partners."

E. D. Frohman, of the S. Obermayer Co., came to town early and engaged Parlor A at the Hollenden Hotel, where, assisted by George Fisher, the originator of the Peerless follow-board compounds, he showed samples of matches made therefrom, which drew con-

siderable attention from the practical stove makers present. It was the universal opinion that a follow-board of the maximum lightness, coupled with lasting wearing qualities and perfect partings, was something much to be desired in nearly every foundry.

The interests of the J. D. Smith Foundry Supply Co. were looked after by J. D. Smith F. H. Chamberlin, E. S. Gaylord and P. G Smith.

T. J. Hogan's popularity was shown in no uncertain manner during the smoker in the Hollenden banquet hall.

The Fanner Mfg. Co. exhibited a full line of stove trimmings at their headquarters in one of the hotel parlors, this being in charge of G. J. Fanner and J. H. Kirkwood.

Whenever Geo. W. Cope, associate editor of the *Iron Age*, and Geo. W. Cope, of the Geo. W. Cope Pattern Works, Detroit, Mich, put up at the same hotel interesting developments are sure to follow.

Among other camp-followers to be seen at the convention were John Hill, of the Hill & Griffith Co.; W. T. Walker, representing F. B. Stevens; W. W. Sly, W. W. Sly Mfg. Co.; E. F. Streich, F. G. Smith and H. R. Atwater, of the Osborn Mfg. Co. The trade press was represented by Geo. W. Cope, H. H. Roberts and Ezra S. Adams, of the *Metal Worker;* T. S. Bowman, of *The Stoves and Hardware Reporter;* Daniel Stern and Sidney P. Johnston of *The American Artisan;* Henry Hansen of *The Foundry*, and George Smart, of *The Iron Trade Review*.

The Milwaukee Convention of the American Foundrymen's Association.

The eighth annual convention of the American Foundrymen's Association will be held in Milwaukee June 9, 10, 11. The Hotel Pfister has been selected as headquarters for the association. The session to be held Tuesday morning, June 11th, will be given over to the reception of delegates and reports from officers and various committees. In the afternoon and evening and Wednesday morning there will be regular business sessions and reading of a number of papers. On Wednesday afternoon there will be a trolley ride to West Allis, where the members will be offered an opportunity to visit the new plant of the Allis-Chalmers Co., located at that point. The return will be made by way of the soldiers' home. In the evening it is proposed to have a theater party.

The last business session will be held Thursday morning and in the afternoon there will be a trolley ride to the parks and other points of interest in which Milwaukee abounds. The visitors will be tendered a smoker Thursday evening. The ladies' reception committee has arranged a complete program for the visiting ladies.

One session will be given over to the foundry foremen's section, and another to the metallurgical section, in order to afford those most interested an opportunity for special discussions, and those who may not be so interested, the opportunity to visit industrial plants in the city in the meantime. There will also be a special session of the foremen's section Monday afternoon, June 8th.

Among papers to be read and questions to come before the convention for discussion are the following:

The Metallurgical Engineer in the Foundry. Henry Souther, Hartford, Conn.

The Molding Machine. (general characteristics, classification, stationary, portable machines, hand presses). S. H. Stupakoff, Pittsburg, Pa.

A Simple Device for Ascertaining the Average Silicon in an Iron Mixture. A. W. Walker, Boston, Mass.

Notes on estimating Methods, Wm. Hanson, Philadelphia, Pa.

Foundry Management. David Spence, Chicago, Ill.

Foundry Control. R. P. Cunningham, Holyoke, Mass.

Retort Oven Coal for Foundry Use. Wm. J. Keep, Detroit, Mich.

Loss of Sulphur in Borings of Pig or Cast Iron. W. E. Dickson, Sharpsville, Pa.

Permanent Molds. Jas. A. Murphy, Erie, Pa.

The Organization and Maintenance of a Satisfactory Pattern Shop. Address by Mr. Jos. Leon Gobeille, Cleveland, O.

Employer and Employe. S. H. Stupakoff, Pittsburg, Pa.

Malleable Cast Iron. Dr. Richard Moldenke, New York.

Notes on the Microstructure of Cast Iron. Percy Longmuir, Sheffield, England.

Notes on Continuous Molding. Edw. Richelieu, South Tacoma, Wash.

Molding Machines. Edw. B. Gilmour, Peoria, Ill.

Blast Furnace Conditions Affecting the Chemical Condition of Foundry Irons. W. W. Davis, Roanoke, Va.

Reduced rates have been granted by the railroads on the certificate plan, of a fare and one-third for the round trip. In order to take advantage of this it is absolutely necessary that the purchaser obtain a certificate at the time of buying his ticket, showing that the holder has purchased this for the purpose of attending the annual convention of the American Foundrymen's Association. This certificate should be handed to the secretary upon reaching Milwaukee, when, after being duly countersigned it will entitle the holder to a return ticket at one-third of the regular fare. The following committees will look after the visitors:

Executive committee: S. W. Watkins, C. E. Sammond, E. N. Dickson, Irving H. Reynolds, A. W. Bair.

Reception committee: A. W. Bair, T. J Neacy, Irving H. Reynolds, W. J. Turner, W. J. Adams, Harry Bayley, F. W. Sivyer, F. M. Prescott, H. F. Crandall, Otto Falk, B. Kavel-edge, V. Nortman, Prof. Johnson, A. J. Lindemann, O. W. Greenslade, C. A. Sercomb.

Committee halls and hotels and carriages: E. N. Dickson, S. Knox, C. A. Maynard, R. J. Schwab, W. J. Turner, T. W. Sheriffs.

Entertainment committee: C. E. Sammond, H. B. Goodrich, G. H. Smith, J. O. Bradley, W. L. Douglas, F. W. Sivyer.

Finance committee: S. W. Watkins, E. N. Dickson, W. J. Read, A. J. Lindemann, O. W. Greenslade, Theo. Vilter, W. H. Osborne.

The American Foundry Co., Indianapolis, Ind.

Just as some cities take precedence in marine, engine castings or any other specialty, so certain towns appear to be given over largely to light castings, as far as the foundry business is concerned. When tonnage is taken into consideration, a large percentage of the output of Indianapolis foundries will be found to be light castings, and among the concerns making a specialty of such is the American Foundry Co.

Where thousands of patterns are received annually and possibly several orders duplicated for castings from the same pattern, it becomes a matter of some importance to have a complete record or system by which the pattern may be readily traced while in the possession of the foundry. When a pattern is received by the American Foundry Co. there is attached to it a "Pattern Record" such as is shown in Fig. 1, the stub at the right being filed at the office. When an order for castings from this pattern is received the tag shown in Fig. 1 is removed and left in the pattern storage until the pattern is returned, when it is again attached thereto. When leaving the storage and entering the foundry, the pattern bears the tag shown in Fig. 2, the stub at the right being given to the coremakers together with the necessary core boxes, while the central portion of the tag goes to the office, where it forms a record of unfinished orders. The balance of the tag is of course retained by the molder until the order is finished, when the pattern is returned to the storage, and given the tag shown in Fig. 1, while the molder's stub goes to the office, where it announces that the order is filled and that the check showing live work should be removed from the record.

From the description here given it will have been noted that the tag shown in Fig. 1 is a permanent record, while the tag Fig. 2 is only used until an order is completed and a record made thereof, when all parts of the tag are no longer useful. Fig. 1 also gives the cost of molding and cores, once this has been determined; although this may naturally be changed from one order to another, at the same time this information is not accessible to the employes, since this tag does not leave the storage. Its chief value is that it gives the employer instant information as to what has been done before, and does not leave him in the dark as to prices paid for either core making or molding on previous occasions. One man has charge of the pattern storage and is held responsible for conditions prevailing in connection therewith.

Where the molders are paid by the piece, more bookkeeping is necessary than where straight time rules compensation. The American Foundry Co. uses the form of "Pay Sheet" shown in Fig. 3, which is so laid out that it may be employed for molders working either by the piece or by the day. A separate account is opened with each molder entering the company's employment, the sheets being large enough to cover a period of about six weeks, when another page is readily inserted in the loose leaf ledger. As this pay sheet is arranged, it is not only a record of what the molder is doing from day to day, but it also shows the condition of any order upon which he may

PATTERN RECORD NUMBER

Name

Shelf No.

Description

Core Boxes

Molding price per Gate

Cost Cores per hundred

DATE RECEIVED	DATE RETURNED

PATTERN RECORD NUMBER.

Name

Shelf No.

Description

Core Boxes

Molding price per Gate

Cost Cores per hundred

DATE RECEIVED	DATE RETURNED

FIG. 1, PATTERN RECORD.

MOULDER'S ORDER.

Tagged

For

Pattern Number

Pieces Ordered. Gates.

Description of Pattern.

Price Per

In Sand Molder

Cores, Etc. Used.

Perfect Castings Only to be Paid for.

Moulders must return Pattern with this Tag attached.

IN SAND.

Tagged

For

Pattern Number.

Pieces Ordered. Gates.

Description of Pattern.

Price per

in sand

Molder

CORE ORDER.

Tagged

For

Pattern Number

Pieces Ordered

No. of Cores	Description Core Box.

FIG. 2. MOLDER'S ORDER, CHECK SLIP FOR OFFICE AND CORE MAKER'S ORDER.

AMERICAN FOUNDRY COMPANY

MOULDER'S PAY SHEET

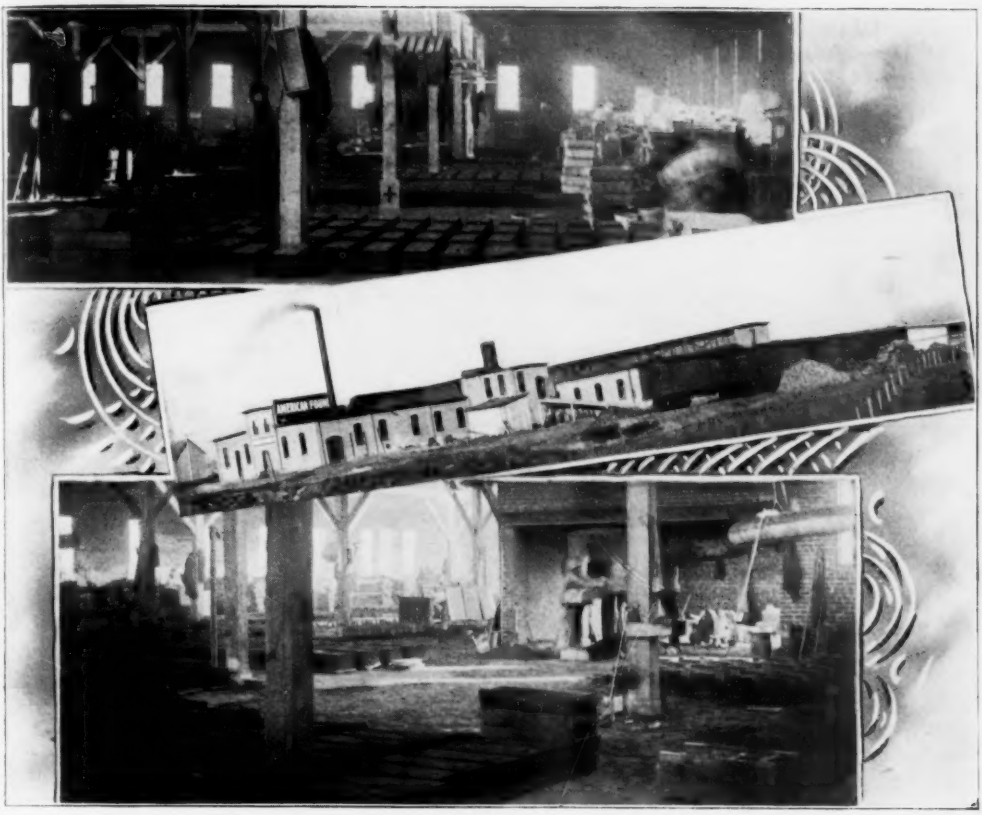
MOULDER _____

FROM _____ TO _____ 190

Date In Sand	FOR WHOM MADE							DESCRIPTION OF PATTERN	Pieces Ordered	Pieces on Gate	Gates per Flask	Price per Gate	Good Castings Trimmed		Total Good Gates	AMOUNT		TIME		
													Date	Pieces				Date	Hours	Total
	Mon.	Tues.	Wed.	Thur.	Fri.	Sat.												Mon. Tues. Wed. Thur Fri Sat		

BAKER-SAWYER CO., MANUFACTURERS, CHICAGO

FIG. 3. FORM OF PAY SHEET.



SOME VIEWS OF THE AMERICAN FOUNDRY CO.'S PLANT, INDIANAPOLIS, IND.

be engaged. A pleasing feature of this form of bookkeeping in connection with foundry employes is that the ledger always shows the number of actual employes, as when any of these leave the company their records are closed and the sheets containing same transferred to other files.

This Year's Convention City.

In selecting Milwaukee as the place to hold its eighth annual convention the American Foundrymen's Association has chosen one of the most typical foundry centers in the United States as well as one of the most progressive. According to its population Milwaukee has more foundries than any of the chief cities of the country and what is more these represent such a wide range of manufacture that the visitor will have no trouble in finding enough of interest to keep his time fully occupied.

Within its borders and immediate vicinity, Milwaukee has 53 foundries, of which twelve make brass castings only, four are malleable shops with a combined daily capacity of 150 tons, eight concerns make steel castings and four make a specialty of manufacturing stoves. In the building of Corliss and other engines the city stands the highest in the United States, when the value of the finished product is considered. The Allis-Chalmers Co. at its Reliance, South Shop and West Allis foundries turns out some of the heaviest machinery castings to be found anywhere, and the last named plant, designed by Edwin Reynolds, chief engineer of the company, is one of the model foundries of the country. The Filer & Stowell Co., builders of heavy duty Corliss engines are at the present time erecting new works to relieve the crowded condition of their present quarters. Besides making its own gray iron castings this company will also install a 15-ton open-hearth furnace to meet its demand for steel castings. The foundry of the Vilter Mfg. Co., manufacturers of Corliss engines, was recently illustrated and described in these columns.

The total tonnage of Milwaukee's steel foundries is not very large, due to the fact that the majority of the plants confine their output to crucible steel castings. The Clinton-Burnham Foundry Co., the Crucible Steel Casting Co., the Nortmann & Duffke Foundry Co. and the Shaw-Gerlinger Steel Casting Co., make crucible steel castings; the J. A. & P. E. Dutcher Co. and the Bay View Steel Casting Co. make acid open-hearth as well as crucible steel castings; the Falk Co. makes acid open-hearth steel castings and the Geo. H. Smith Steel Casting Co. makes Bessemer steel castings. Some time ago it was reported that the Christensen Engineering Co. would also manufacture crucible steel castings for its own consumption.

The malleable plants located at Milwaukee are: The Milwaukee Malleable & Gray Iron Works, the Northwestern Malleable Iron Co., the West Allis Malleable Iron & Chain Belt Co. and the Wisconsin Malleable Iron Co.

The Brand Stove Co., the Fuller-Warren Co., the A. J. Lindemann & Hoverson Co. and the Milwaukee Stove & Foundry Co. comprise the city's stove manufacturers. Other lines such as furnaces, heaters and plumbers' supplies are represented in addition to a large number of jobbing foundries. The plant of the Milwaukee Harvester Co., previously described in THE FOUNDRY, and now a division of the International Harvester Co., also possesses many points of interest. Taking it altogether the diversity of Milwaukee's foundry interests is such as to offer visitors to that city plenty of opportunities to observe things they have not seen before. Should they tire of foundries they may gain an insight into the way foundry iron is made by spending a few hours at the Minerva furnace of the Thomas Furnace Co.

Lunch Serving at the Foundries of the Pratt & Letchworth Co.

Of all industries the foundry represents one of the most difficult in which to carry out any general shop improvements. Attempts may be made to keep a foundry ever so clean, and yet, it will be a dirty place, and never can be anything else. The materials used, together with the operations carried on, produce an uneven temperature and a certain amount of dust not present in other occupations. Nevertheless, many concerns are earnestly seeking to make the conditions and surroundings of their foundry employes as pleasant as possible.

In large cities a great number of workmen are forced to eat their noon meal away from home, and to make this more palatable, the Pratt & Letchworth Co., of Buffalo, N. Y., some time ago made arrangement to provide hot soup and coffee for such of its employes as desired to receive these side dishes. The firm assumes the cost of cooking and distribution, and it is calculated that the cost of material will be about met by the charges made, which are 3 cents for a bowl of soup, 1 cent for a cup of coffee and 1 cent for a quarter of a loaf of bread. To make the system as simple as possible no credits are carried, small checks of 1 and 3 cent denominations being issued as a matter of convenience. Helpers are detailed from each department previous to the noon hour to carry the food from the kitchen to the distributing stations throughout the works and every care is taken to have this served as rapidly as possible. The illustrations on the opposite page are from photographs taken during the noon hour at the foundries of the Pratt & Letchworth Co.

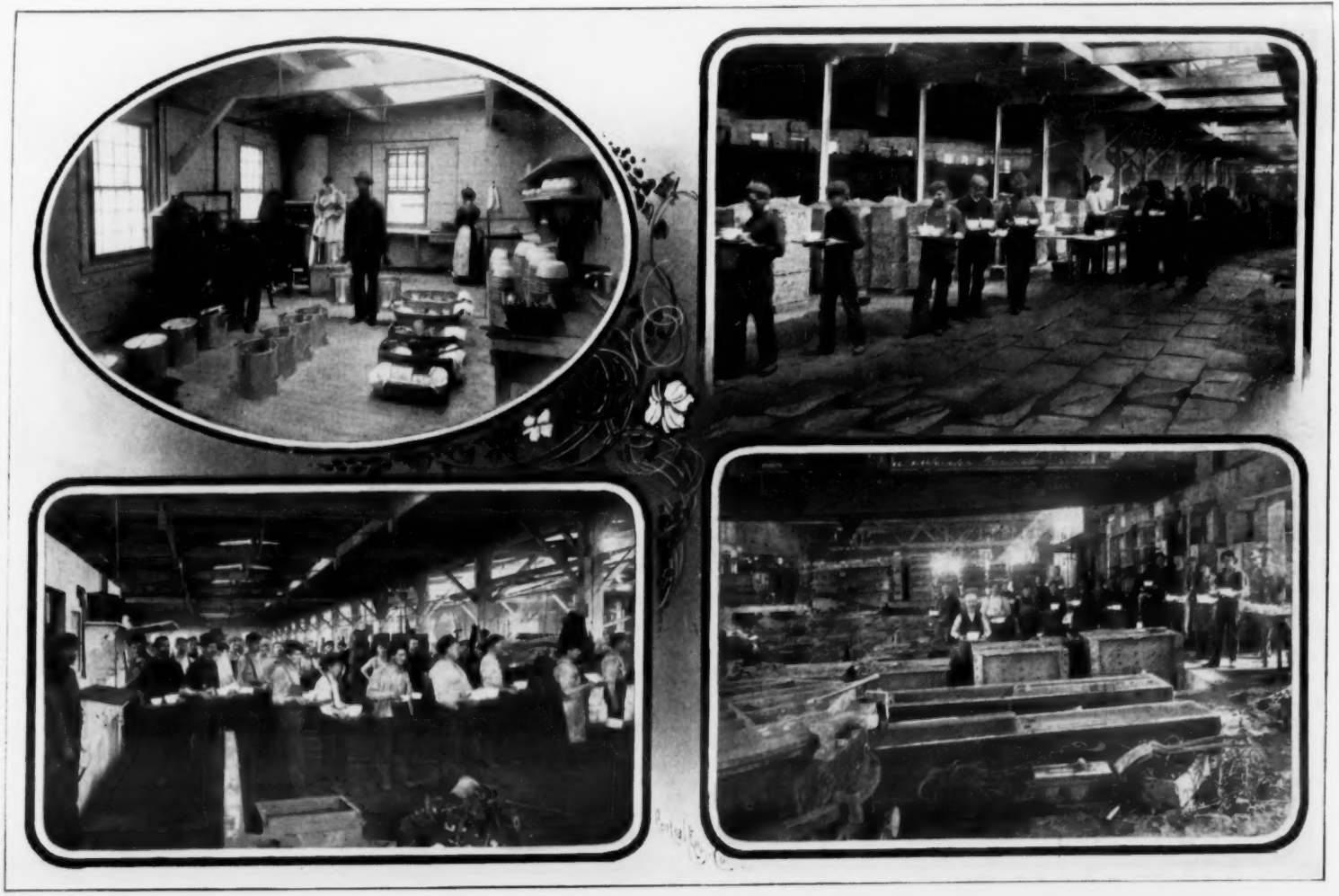
Soft vs. Hard Trolley Wheels.

In the early days of the trolley cars the first thought of the brass founder was to make a hard trolley wheel. His only idea appeared to be to make a wheel which would not wear out. Bell metal and other hard bronzes were used; indeed, in many instances, such hard alloys were produced that special steels had to be used to turn them. This condition now appears to have been changed. The axiom exists among the trolley companies, "That it is better to wear the wheel than the wire."

This is undoubtedly so, as a wheel is much more easily replaced than the wire, and the expense less. Such a reaction in regard to soft wheels having set in, works quite favorably for the maker as well as the consumer. The castings are cheaper and are worked more easily than the harder alloys, with a consequent reduction in price.—*The Metal Industry.*

A Great Combination.

The Chamber of Commerce has under consideration a proposition for the organization of a stock company here for the establishment of a large stove foundry, also three proposals for the location of female colleges.—Birmingham (Ala.) *News.*

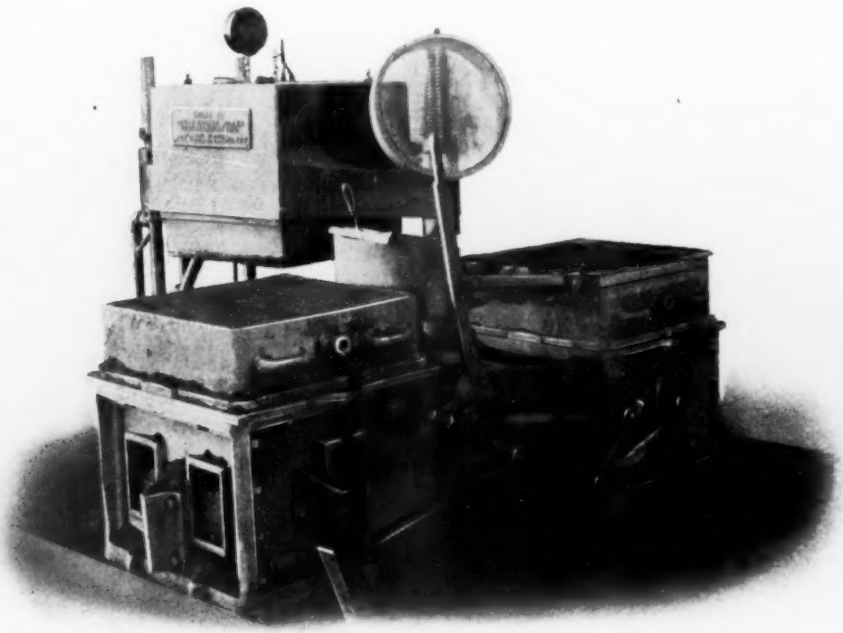


LUNCH SERVING AT THE PRATT AND LETCHWORTH CO.'S FOUNDRIES.

An Interesting Melting Equipment.

Among the earliest pioneers in the foundry industry to specialize its product and provide mechanical means for lowering the cost of its castings were the Atlas Engine Works of Indianapolis, Ind. This concern was also among the first to recognize the value of the air hoist and trolley track for rapidly handling molds, and in this respect is probably better equipped today than any other foundry in the country. In the matter of molding machines, one of special design was gotten up for the company's use a good many years ago, this being one of the earliest power ramming machines, known as the "Yielding Platen" machine, from the fact that pressure is applied through a strong rubber bag, filled with water, attached to the ramming head of the machine. The object sought is of course to ram the mold to a uniform degree of hardness. Flasks of ordinary construction are used on the Atlas machine and where necessary gaggers may be set in the mold as long as these do not reach above the level of the flask. It is also the custom to leave the bars a short distance below this level, which facilitates even ramming.

At the present time the Atlas Engine Works operates three foundries, located in close proximity to each other. The old shops contain several molding machines of special design for turning out engine frames, these being of the stripping plate or pattern drawing type, the mold being rammed by hand. They are worked in pairs, one forming the cope and the other the drag. The chief advantage in these is that the mold is practically ready to close as it leaves the machine, whereas in hand molding the workman will spend considerable time in dressing up broken parts. One can hardly appreciate the rapidity with which a complete mold can be made, where every precaution has been taken to avoid tedious hand work. Foundry No. 2 is 70x300 feet in size and is largely given over to the molding of boiler castings. It sounds a bit queer to say that boiler fronts are turned out quicker than one can describe the operation, yet such is the case. These castings are not molded in one piece but divided into four sections, which facilitates handling. No attempt has been made to install a general system of sand conveying; instead the machines are ranged in pairs, one conveyor serving two machines. This makes each



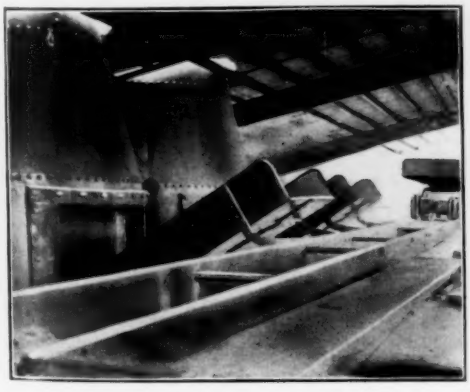
THE ATLAS "YIELDING PLATEN" MOLDING MACHINE.

MELTING HOUSE AND ARRANGEMENT FOR ELEVATING LOADED CHARGING CARS.

unit independent of the other and a breakdown of relatively small importance. Foundry No. 3 is intended for the production of heavier castings, such as fly-wheels and the like, and is 120x500 feet. The operators of molding machines are of course specialty molders in a very narrow sense of the word. They start in at $1.40 per day and after working two years receive the machine operators' standard pay of $2 per day. Naturally many of these find a chance to obtain better paid employment and new hands have to be constantly broken in. The number of this class of workmen in Indianapolis was thought sufficiently large by the Iron Molders' Union to justify it in instituting a separate local to look after their interests exclusively.

The economical handling of cupola stock and melted iron is a problem that confronts the manager of every large foundry. Where plenty of ground space is available this is somewhat simplified and only the amount of money at hand places a limit upon the completeness of the equipment for the melting department. In the case of the Atlas Engine Works, its original site is covered with factory buildings of various kinds and it was therefore decided to concentrate the melting operations at one point and from this distribute the melted iron to the different foundries. The new melting house is located about a quarter of a mile from the

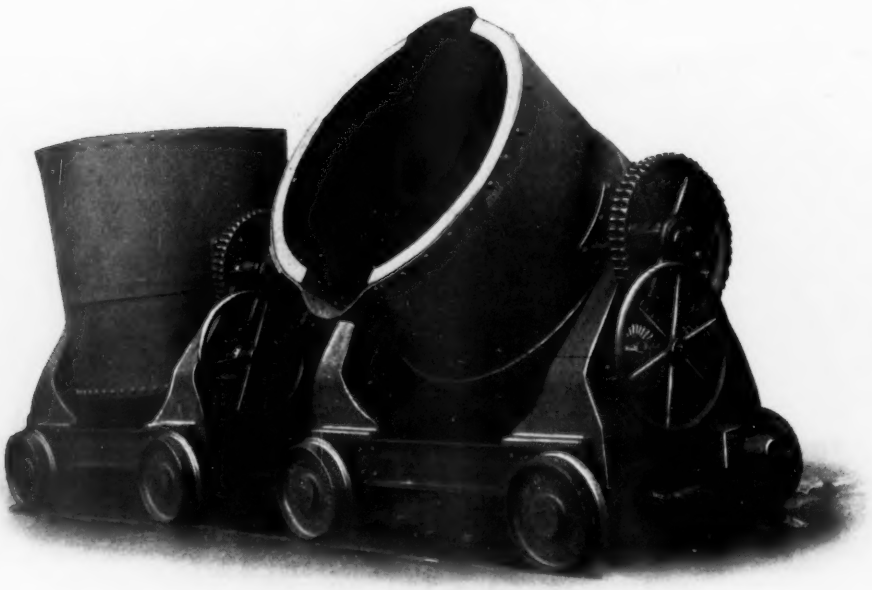
A TRAIN OF LADLE CARS IN FRONT OF CUPOLA SPOUTS.



CHUTES LEADING TO CUPOLAS. SELF-DUMPING CHARGING CAR IN THE DISTANCE.

foundries, and excellent switching facilities are provided for promptly handling material. The building has been planned to hold six cupolas, it being the intention to operate these on alternate days, unless the demand for iron should become excessive, when the full quota can be brought into use.

When completed the Atlas melting plant will require the minimum amount of labor in its operation. The charges of fuel and iron will be made up on self-dumping cars



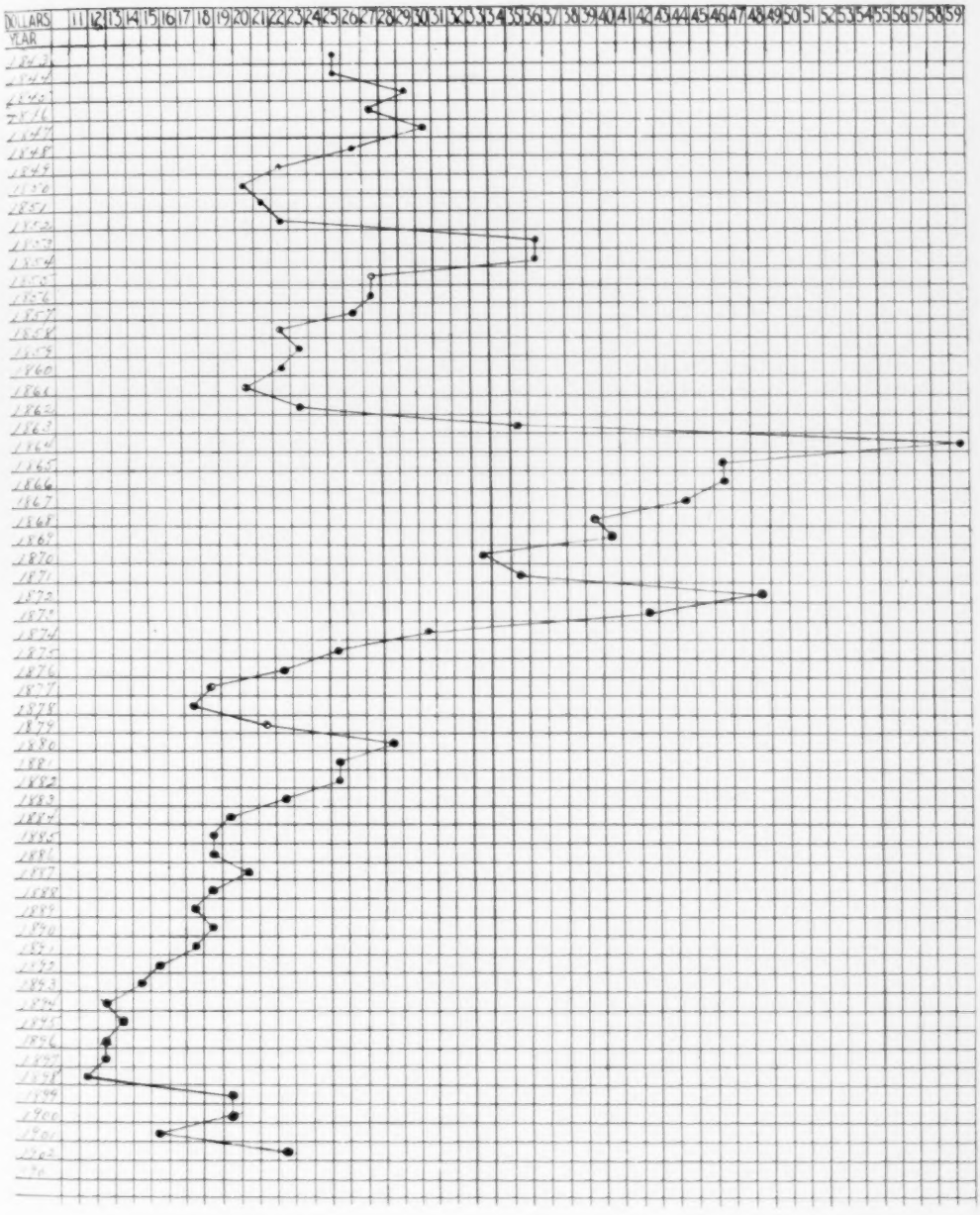
GEARED TRUCK LADLES, 10 TONS CAPACITY. MADE FOR THE ATLAS ENGINE WORKS BY THE WHITING FOUNDRY EQUIPMENT CO.

and after these pass the yard scales for checking, they will by gravity descend the track in the culvert shown at the left of the building, their speed being checked by the rising stub track shown in the foreground, which again gives them sufficient motion in a reversed direction so that they run upon the track leading to the upper floor of the melting house, where an electric hoist and endless chain belt furnishes an automatic elevating apparatus. A spring switch at the junction of the track from the yard with the track to the cupola platform permits a car to travel from the scales to the cupolas without a hand touching it, quite an achievement in handling stock for cupolas. When the car has discharged its load it continues to the other end of the building, where provisions are made for two elevators to carry the empty cars back to the yard.

To the right of the melting house proper may be seen a lower structure, having a sliding door, under which extends another conduit, in which is laid a standard-gauge track. This leads to the cupola spouts where the metal will be tapped into Whiting geared truck ladles, having a capacity of 10 tons each, and conveyed to the different foundries. With everything in working order it is calculated that a ladleful of iron can be placed where wanted in less than five minutes, and the excellent system of trolley tracks existing in the Atlas foundries, will permit of the distribution of this iron in smaller ladles with remarkable rapidity. It sounds peculiar to speak of a foundry without a cupola, yet there is no doubt that where large bodies of metal are to be melted the concentration of melting equipment at one point presents certain features of economy over scattering this in several places, where each unit demands separate management and labor to operate it.

A Little Excitement at Beatrice Nebraska.

Saturday night as the men in the foundry at Dempster's were about to quit work, a terrific explosion was caused by hot slag being poured into the cupola when it had a quantity of water in it. The windows and doors were all blown out, about fifty men were knocked down and two or three badly burned. The foundry was filled with flying sand for a few moments and the greatest excitement prevailed.—St. Joseph (Mo.) *News*.



Fluctuations in the Price of Pig Iron for Sixty Years.

We recently printed the average price at which pig iron had been sold at Philadelphia for sixty years, according to figures compiled by the American Iron and Steel Association. Mr. William R. Hart, of Lawrence, Mass., prepared the accompanying chart which shows in graphic form the wide changes witnessed in the value of iron during the last two generations.

Molding Sand.*

The Albany and Jersey molding sands were among the first deposits discovered in this country, and have ever since enjoyed the con-

*From a paper read by F. E. Gordon, of the Ohio Sand Co., before the Pittsburg Foundrymen's Association.

fidence of the trade, which is still justified when the selection is made by an experienced and reliable man. Albany sand is a surface or shallow-veined sand lying immediately below the top or agricultural soil, which runs from 7 to 10 inches in depth, and is stripped off in benches about 3 feet wide, running the length of the pit, or as long as may be convenient. The veins of molding sand underlying this will run from 6 to 24 inches in depth, with an occasional pocket reaching as much as 5 feet, though the average will not exceed 18 or 20 inches.

When it is stated that from 25,000 to 30,000 cars, or 900,000 tons, are shipped from these districts annually, one will immediately realize that a vast territory must have been worked over, and that all sand sold in the last 50 years could not have been Albany and Jersey sand and have come from the original pits. Discoveries of sand of a similar quality have been made in other localities which have helped to keep up the supply, although the finding of new deposits becomes more difficult each year.

Next in age and reputation to the territories mentioned and supplying a large market west of the Allegheny mountains is the Conneaut district located in the extreme northwestern part of the state of Ohio. Sand has been shipped from here for 45 years, and within the last 20 years this sand has become a formidable competitor of eastern molding sand. The Conneaut sand is a close duplicate of the Albany product and like this is also found in shallow veins. These sands have always been known as "safe" sands, because they contain the necessary bond, and yet are open enough to vent freely and will not scab, cut or blow if reasonable care is exercised in molding.

Around Sandusky, Ohio, are also to be found molding sands which, however, possess a drawback in that they show a tendency of running to the extreme in openness. Besides this but little attention has been given to supervision in grading and loading sand from this district, and its use has therefore been largely confined to its own locality. Another Ohio molding sand, well and favorably known, is that coming from the Zanesville region, in which the veins are all deep.

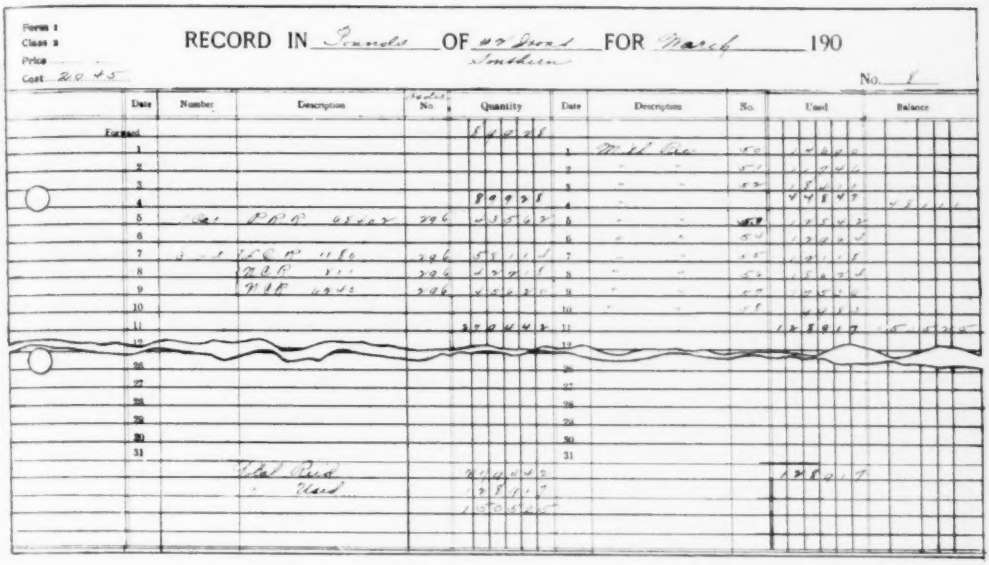
The difference of a few cents a ton in the price of molding sand too often decides the sand which shall be used when the decision is left to the purchasing agent or office man. The proper molding sand for different classes of castings can always be obtained at a reasonable first cost, and it is a very poor policy to take cheap material. The time spent in fixing up inferior molding sand largely exceeds the cost of good molding sand in the first place and if we follow this subject further we will find that after the castings leave the foundry more time is spent in the machine shop in making them presentable.

Foundries should learn to place their orders for sand ahead of time, as it should be borne in mind that there are no roofs over sand pits and that if an order has to be filled in a hurry the cars may have to be loaded when the sand contains an excess of moisture. Consideration has to be given to the car supply, rain and labor, and rain means much in the sand business. Sand cannot be properly loaded in wet weather and oftentimes it requires several days for sand to become in a fit condition to ship after a hard downpour. The foundry which places its orders early for molding sand will receive the best attention and, in the end, be money ahead.

Perpetual Inventories.

There always has and probably always will be more or less discussion concerning the practice of keeping perpetual inventories and stock records. There are some who think that such records are useless and an unnecessary expense, claiming that they require considerable work in both the shop and the office, and that the records are inaccurate at best. Others believe in keeping stock records, but not records of material. Still others claim that accurate and reliable records can be kept of both material and finished product, and that the small clerical expense connected with the obtaining of these records is more than made up by the advantage of being able to ascertain the amount of stock and material on hand at all times. There are no doubt good grounds for each opinion on this subject, as it may be perfectly practical to run perpetual inventories in some lines of business, while in other lines it would be impossible.

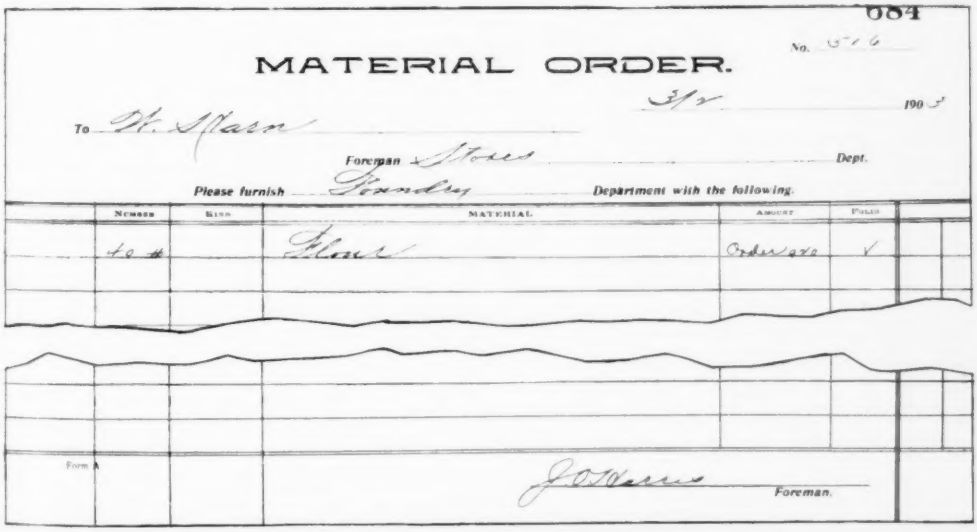
In our business we have found that it is greatly to our advantage to have an accurate record of the stock kept, and that perpetual inventories of material can be kept which will be so nearly exact that the trifling differences will do no harm. The principal disadvantage we have to contend with is the lack of adequate store room space, and to a concern having ample store room facilities there would not be this handicap to the system here de-



FORM 1. MATERIAL RECORD. ORIGINAL 8½X11 INCHES.

scribed. The best plan would be to keep all material in a good sized room or building, divided off into sections, with plenty of bins, shelves, cupboards, etc., numbered or lettered in such a manner as to make access easy to any class of material. Of course such material as iron, coke, sand, etc., would have to be kept in the yards, but the majority of supplies could all be stored as above.

The forms used for the inventories and records are not many, and are very simple, being in essential features the same as a double entry ledger, modified of course to suit the requirements of the system. These forms can be made either in loose sheets or cards, according to the preference of the user. In the system here illustrated, both the cards and loose sheets are used. Form 1 is the Material Record, representing in this case the number of pounds of No. 2 Southern iron



FORM 2. REQUISITION FOR MATERIAL. ORIGINAL 5½X9 INCHES.

Flour

LOCATION

MINIMUM 1 bbl UNIT lb FLOOR 1

NORMAL 5 bbl ROOM 1 SECTION 3 BIN OR SHELF

REMARKS NO.

Received			Delivered						Balance		
DATE 1903	ORDER NO.	QUANTITY	DATE	ORDER NO.	QUANTITY	DATE	ORDER NO.	QUANTITY	DATE	QUANTITY	COST
3/1	162	7000	3/1	511	79				3/8	1611#	36 72
			2	516	40				3/15	1650#	33 00
			3	518	21						
			4	523	35						
			5	527	31						
			6	530	32						
					169						
			8	534	45						
			9	542	33						
			11	543	75						
			12	548	38						
			13	550	70						
					161						

SHAW WALKER 9381

FORM 3. RECORD OF MATERIAL ISSUED ON REQUISITIONS. ORIGINAL 4X6 INCHES.

FORM E 1

RECORD IN Pounds OF Flour NO. 11

NO.

CLASS MARK WHERE KEPT

MONTH	ON HAND	RECEIVED	USED	BALANCE	PRICE	VALUE ON HAND	VALUE USED
BALANCE	210						
JAN.		10000	3864	8946	02	1788	7722
FEB.			8946	XXX			1788
MARCH							
APRIL							
MAY							
JUNE							
JULY							
AUG.							
SEPT.							
OCT.							
NOV.							
DEC.							
TOTALS							

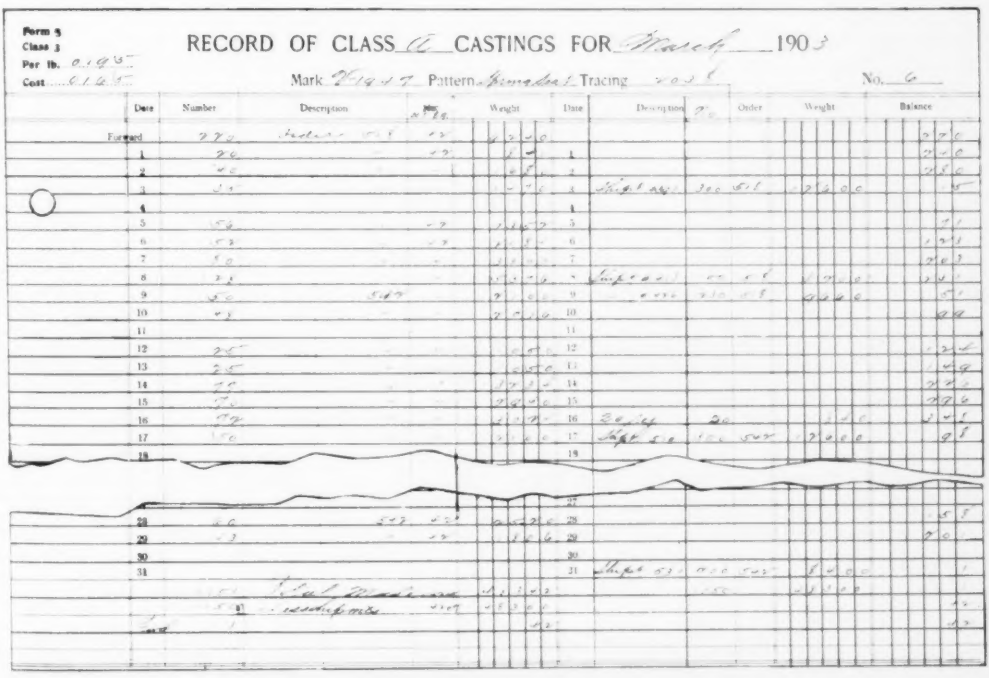
REMARKS:-

SHAW WALKER MUSKEGON 7472

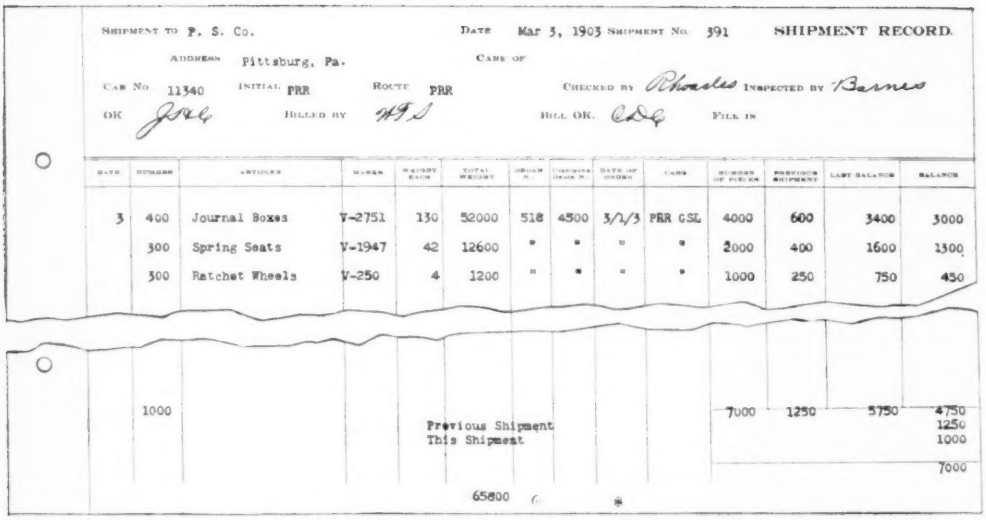
FORM 4. RECAPITULATION OF MATERIAL BY MONTHS. ORIGINAL 4X6 INCHES.

used during the month. The left-hand side is devoted to the receipts of iron and the right-hand side to the quantity used. The figures in the date column represent the days of the month. In this form it will be seen that cars of iron were received on the fifth and seventh of the month, the weights being extended to the "Quantity" column while other information concerning the shipments are given in the "Number" and "Description" columns. The right hand side of the page corresponds to the credit side of the ledger page, and gives the quantity used. This is obtained from the daily foundry report (illustrated in the March issue) and is posted up each day. As soon as these reports are entered on the cost card they are passed on to the clerk who has charge of the material and stock records, who enters up all material shown on them and they are then filed away. It would be quite practicable to obtain a balance of any material each day, but this is not considered necessary, once a week being all that is required. At the end of the month the balance on hand is carried forward to another sheet. These sheets are used to keep a record of iron, scrap iron, coke, sand, molasses, and any other supplies which cannot be kept in the store room. Each kind of material has a separate sheet, and is used in precisely the same way as the form illustrated, the only difference being in the different units of measure used.

We now come to material which is kept in the store room. This is always issued on requisitions from the foremen, and nothing is given out without a requisition, such as is shown in Form 2. It is not necessary to have as many columns as are shown, these being old forms printed when the system was in the experimental stage. It is better to simply have a form which a plain writing space provided below the heading, and no columns whatever. In case of material being required for a particular shop order, the order number is noted on the requisition. It would be vastly better if each requisition could be made to show the order for which it is intended, but in a foundry where anywhere from ten to twenty orders are being gotten out at once we believe this to be impossible. Each morning the requisitions of the previous day are turned in to the office, and are entered on a card as shown in Form 3. This is used on very much the same principle as the loose sheet, the main difference being that new sheets are made out each month, while the cards are kept in use until filled up. There is also more information given on the card, an accurate guide to


Form 5
Class 3
Per lb.
Cost
RECORD OF CLASS C CASTINGS FOR March 1903
Mark Pattern Tracing No. 6
Date | Number | Description | Weight | Date | Description | Order | Weight | Balance
Forward

FORM 5. CASTING RECORD. ORIGINAL 8½XII INCHES.



SHIPMENT TO P. S. Co. DATE Mar 3, 1903 SHIPMENT NO. 391 SHIPMENT RECORD.
ADDRESS Pittsburg, Pa. CARE OF
CAR NO. 11340 INITIAL PRR ROUTE PRR CHECKED BY Rhoades INSPECTED BY Barnes
O.K. JSL BILLED BY HPS BILL O.K. CDG FILE IN

DATE	NUMBER	ARTICLES	MARKS	WEIGHT EACH	TOTAL WEIGHT	ORDER NO.	INVOICE ITEM NO.	DATE OF ORDER	CARS	NUMBER OF PIECES	PREVIOUS SHIPMENT	LAST BALANCE	BALANCE
3	400	Journal Boxes	Y-2751	130	52000	518	4500	3/1/3	PRR GSL	4000	600	3400	3000
	300	Spring Seats	Y-1947	42	12600	"	"	"	"	2000	400	1600	1300
	300	Ratchet Wheels	Y-250	4	1200	"	"	"	"	1000	250	750	450
	1000									7000	1250	5750	4750
													1250
		Previous Shipment											1000
		This Shipment											7000
					65800								

FORM 6. SHIPPING RECORD. ORIGINAL 8½X13 INCHES.

the location of the material being shown, and space provided for requisition numbers and value of balance on hand. If required, a daily balance could easily be obtained as it would be a very simple matter to deduct the amount used each day from the previous day's balance, but this is hardly necessary, and we usually content ourselves with the weekly balances which we get by footing up the quantity used during the past week, and deducting it from the last balance.

A sort of monthly recapitulation is also used which gives the value on hand at the end of each month, the total amount used during the month, and other information of the same kind. This is of more value as a record for comparison than anything else, but is also useful in making up monthly statements and reports. Form 4 shows the card used.

So far we have discussed only such methods as relate to the recording of material. We now come to the stock accounting, which is considered of great importance, and is kept with extreme accuracy at all times. Form 5 is the Casting Record. It is identical in most respects with Form 1, the data being collected in a slightly different way. One sheet is made up each month for each style of casting which is regularly manufactured, one sheet for general castings, one for shop castings, and a sheet for each special contract order. These records are kept very carefully, the balances on hand are noted each day, and all rejections are shown. It is the aim to make this a complete record of all castings, and it is of great utility in arranging for our shipments.

The form illustrated gives the record of spring seat castings for the month of March. On March 1st, there were 220 of these castings in stock, and on the same day 20 were made. The weight is carried out in its proper column, and any other information deemed necessary is given. This data is obtained from the daily production sheet. On the 2d 40 more were made, bringing the balance up to 280, and the 3d there were 35 made and 300 shipped, leaving a balance of 15 on hand. The shipments entered on the right-hand side of the page are gotten from the shipping records which are shown in Form 6. On the 16th 20 spring seats were rejected by the inspector after they had been entered up as good, and they are deducted, being treated as shipment. In entering up the number of castings and their weight as shown on the left-hand side of the sheet, the clerk takes the production sheet and takes the different kinds of castings in the order that the sheets come in his binder, and having found the total number made on that date, with the weights, he posts the amounts to the sheet and takes the next in order, treating it in the same way. It takes but a short time each day to do this and the complete record thus obtained is of great value. As soon as the shipping record is made out it is also entered on the opposite side and opposite the proper date, but the balance is not counted up until the next day, when the

castings of the corresponding date are posted. At the end of the month the last balance is verified by an inventory being taken of the castings in the shop, and is carried forward to another sheet. It is not a difficult matter to get this inventory, as we aim to ship out almost everything on hand before the last of the month.

The shipping record shown in Form 6 is made out in three copies, one for an office copy, one for the shipping clerk and one for the checker. This form will hardly need any description, as it is very simple. The principal feature of interest on it is the arrangement of the last four columns, which allow for the number on the order, the amount previously shipped, the last balance: i. e., the amount remaining after the last shipment; and the present balance. This permits us to keep accurate track of all orders which are not shipped complete.

In the different systems we have described in this and in previous articles in *The Foundry*, we lay considerable stress on the principle that nothing whatever shall be done without it being strictly accounted for, as we firmly believe that no system can be a success, and in most cases will be more of a detriment, unless this rule is strictly followed.

R. W. MACDOWELL.

CAST IRON NOTES.

Devoted to inquiries from Practical Foundrymen on the subject of Melting and Using Cast Iron. Address all inquiries to W. J. KEEP, care of The Foundry.

WET OR DRY COKE AND AIR FOR MELTING IRON.

Question: Does it take more coke to melt iron if this has been exposed to rain? Which will make the hottest iron, dry or moist air?

Answer: At first thought it would appear that wet coke and damp air should show the same effect, but such is not the case.

It is difficult to prove whether better melting is being done on a dry or wet day because the quality of coke will vary from day to day and it is a difficult matter to decide upon the cause of slight variations in the quality of melted iron. The fact that we have no definite information on this point shows that there is no very great difference.

It has been taught by some that steam introduced near the melting point was beneficial. This can make very little difference if the steam is superheated or when the same moisture is introduced with the cold air blast, because the instant the steam and air meet they mix and are of the same temperature. In whatever way the moisture is introduced, the moment it reaches the melting point it is decomposed, in doing so utilizing heat, which should instead have melted iron as it was intended to do.

I have introduced steam into cupolas in various ways and never could detect much variation in the quality of iron, though this was never so hot as when melted without the steam. From the fact that most foundries use more coke than is actually necessary to melt iron, the ordinary changes in the moisture of the air will not be felt in the cupola. If a founder was using the least possible quantity of coke that would be required to melt iron he would then be compelled to add a trifle more coke whenever the air was full of moisture. In other words, dry air is best. Wet or dry coke is a different question.

Dry coke charged between alternate layers of iron becomes incandescent from the heat existing at the melting point, and the large excess of air that is driven in burns a considerable part of the coke before this reaches the point where it can melt iron.

If the coke is soaked with water when charged, the water will be completely dried out before the coke reaches the melting point, but the water will have prevented the coke from being burned as much as would be the case if it had been charged dry.

If coke is weighed when dry and then wet with water just before it is charged into the cupola the iron will be hotter than if the coke is charged dry. If this is so, then it follows that a less quantity of wet coke may be used and will accomplish the same amount of work than a slightly greater quantity of dry coke. This leads to the conclusion that coke which is saturated with water through having been exposed to rain may be weighed up the same as if it was in a dry condition. I have kept two hundred pounds of coke in a box with a perforated bottom, exposed the same as the pile of fuel from which we were obtaining our daily supply and by weighing this each morning I found that it contained anywhere from 0 to 12 per cent moisture, yet, we did not notice any difference in the temperature of our iron which could be accounted for by wet coke.

What has been said in the foregoing bears no relation whatever to the subject of utilizing

steam at the melting point; instead it refers to the question of getting the coke to the melting point in better shape. Of course it will not pay to purchase coke having an excess of moisture, because it is much cheaper for one to add this element himself rather than pay coke prices for it. It is probable that in drying water out of wet coke a very small quantity of sulphur is driven out along with it.

Charging coke in winter when this is covered with snow and ice is a very different matter, as the weights will be wrong and the coke will not absorb the water. In cold weather iron is often charged when it is covered with white frost and at a temperature nearly zero. If a certain amount of coke will just melt the iron during the summer this may not heat it in the winter time to the melting temperature before it reaches the melting point, therefore under these conditions it will be necessary to use more fuel during cold weather.

The Addition of Silicon in the Basic Process For Steel Castings.

Perhaps no more troublesome features have arisen among manufacturers of steel castings who are using the basic process than the control of silicon in the furnace additions just previous to tapping.

From the nature of the method whereby the phosphorus is all or nearly all removed from the metal by the lime flux employed, the compound thus formed between the phosphorus and calcium of the flux is very easily dissociated, leaving the phosphorus in a liberated state, which is quickly re-absorbed by the steel in the bath. This breaking up of the chemical compound is usually caused by the addition of silicon or silicates, which form silicates of calcium and set free the phosphorus.

It often occurs in analyzing a cast of basic steel that a percentage of phosphorus is found which in some cases is so great as to preclude any possible use of the castings with safety.

Among certain works employing the basic process and where I have made exhaustive tests and experiments along this line, I have found that the last furnace test sent to the laboratory previous to tapping the heat, has shown less than .005% of phosphorus and the castings poured would sometimes reach as high as .15% phosphorus.

Such occurrences, while not often met with in carefully managed furnaces, do happen, however, much to the discomfiture of the producer and the chemist, the latter often being blamed for incorrect determinations when in reality he should have been fully exonerated.

This return of phosphorus to the metal may be attributed to three causes. The first of which is the injudicious use of ore when the carbon is already nearly low enough to conform to the requirements.

Melters as a rule often try to hasten a heat at the finish for no other reason than their personal desire to produce an early tap. To do this they lower the carbon rapidly by the use of iron ore; overcharging the metal with oxygen and oxides, which eagerly unite with the silicon subsequently added, thus forming new silicates to react upon the slag detrimentally. The metal not only picks up more phosphorus, but is apt to be "wild" in the molds, caused by the insufficient amount of silicon present to quiet the metal. An increase of manganese or aluminum would to a certain extent act beneficially, but if the use of ore is prohibited toward the final time of refining much more satisfactory metal is produced.

The second cause, though not of so common occurrence, is the entrance of silicates into the bath from molten silica brick running down from the ports and the roof of the furnace.

The third cause, and the one which has been the "bête noir" of all basic steel men, is the proper way to add silicon with the least action on the slag, and it is the writer's purpose to outline a process which is not only theoretically feasible, but which has produced hundreds of consecutive heats of absolutely quiet metal, extremely low in phosphorus, and making an excellent quality of tough, strong, steel.

The method usually pursued is to allow the ferro-silicon or silico-spiegel additions to melt in the bath after being first preheated to redness or below that temperature. In this way a considerable portion of the silicon is lost and taken up by the slag, giving a higher phosphorus metal with a much lower silicon contents than would be shown by mathematical calculation of the exact percentage, based on the analysis of the material used in the addition. In the most carefully conducted heats this loss of silicon is appalling, and while perhaps this is given little consideration by the management, it is really a matter of dollars.

My system is as follows: Arrange a small cupola whose bed approaches as nearly as possible the amount of furnace additions to be used. As soon as the furnaceman finds his

neat nearing completion, the blast is put on at the cupola and the charge melted down and drawn off into a small ladle which is taken to the open hearth furnace and held over the large ladle in readiness for the tapping of the steel.

Assuming the chemist has found the steel free from phosphorus, a tap is made and the molten additions allowed to run into the large ladle, while not more than one-half the steel has run out from the furnace. By the time the slag has come, the steel has absorbed the silicon and manganese and there is no further action on the slag.

I have found it advisable to melt about one-half of the ferro-manganese to be used, in the cupola with the ferro-silicon and the other half I run through the furnace in the usual way. This quiets the metal and gives better results than if the metal were tapped when boiling and also gives a smaller loss of silicon.

If this method of molten additions is carefully manipulated there need be little loss of silicon and the use of aluminum will never be found necessary.

W. E. MUMFORD.

An Australian Statue.

Already several monuments and memorials have been raised as a tribute to the fallen heroes of the Boer war, and as I was fortunate enough to be identified with the preparations for casting the bronze group shown herewith, which has been described as one of the most interesting and suggestive of all the public memorials of fallen Australian soldiers in the South African war, I feel that the features connected therewith will be of general interest to the readers of THE FOUNDRY, particularly so, since this casting was made by a molding process, the details of which are not generally understood. The design is by Mr. James White, a sculptor of Sydney, New South Wales, and is entitled "In Defense of the Flag."

The memorial represents an officer who has come to the rescue of a wounded trooper who has fallen with the regimental colors tightly grasped in his left hand. The officer is standing over the reclining figure "at the ready," and has seized the trooper's rifle and bayonet. The wounded man is in the act of assuaging his thirst from the officer's water-bottle, which he has just managed to release from its position. The two soldiers are wearing the uniform of the Western Australia mounted troopers, and the details of the men's accoutrements have been faithfully reproduced, the ensemble being very striking. The group alone stands 7 feet 6 inches high, and it has been placed on a 12-foot 6-inch pedestal in the public park at Perth, W. A. The total weight of bronze is about 26 cwts., and it was cast in two pieces owing to the restricted head room of the workshop, the parting being made on a line between the rifle and reclining figure. Mr. White

"IN DEFENSE OF THE FLAG," AN AUSTRALIAN STATUE.

would have preferred to cast it entire and save burning, but found that this was not practicable.

The first part to be cast weighed quite 18 cwt. and included most of the difficult modeling. Many molders are under the impression that the only part of the "*circ perduc*" process requiring skill is the modeling of the design. This is a glorious mistake. If a "sand artist" was given a perfect wax model and set about reproducing it in metal, by the rules of ordinary foundry practice, he would find himself

hopelessly muddled in less than no time. The difficulties of the process at this stage may be summed up as follows: First, the mold has to be made *in situ*, and cannot be examined, handled or bound like an ordinary sand mold. Second, the model requires to be surrounded with some plastic material which will take a sharp impression, set hard, resist pressure, stand a good fire test and which will not damage the most delicate lines, or be too absorbent of the wax. Third, when such a material is found there is the detail of covering the object with a thickness proportioned to the amount of surface exposed to pressure during the cast.

This is a thing which cannot be worked out by the ordinary rules, because, in the process of drying cracks may occur in the interior, and as these are both invisible and unget-atable, extraordinary precautions are necessary. Fourth, there is no possible means of determining when every part of a large plaster mold of varying and intricate section is absolutely free from moisture, therefore the drying of these molds (on which a great deal depends) is a matter for experience and special judgment.

There is here a vast field for "high art" in molding still undeveloped. The present-day molder, if he is not already a machine, is generally content to be an imitator. He knows but one way of duplicating an object, and that, by pounding sand around it; and the greater the number of duplicates required the better pleased he is. He is a kind of an automatic duplicator—a sandy-handy man, who likes nothing better than a pattern with a running number off, or a job where worry is reduced to a minimum. These automatic molders are the product of our hustling propensities, and the bane of the general foundry foreman. If you take one of them from his special class of work and put him on some other line, you disarrange his mechanism and destroy the harmony of the output. Seriously, there are methods of molding which no aspiring tradesman can afford to ignore or neglect and the wax process is one of these. Nonchalance is only becoming in a numbskull, and no molder has the right to despise any process connected with his own line of business.

Many other substances besides clay, loam and sand, have been pressed into service as impressionable material for a matrix. Bread crumbs, gelatine, papier-machê, sulphur, plaster-of-paris, vulcanite, gutta-percha, etc., have all their uses in this respect, and in some cases a composite material from several of these substances has been found to give more perfect results than any of them taken singly. For example, in the wax process, the mold is usually composed of plaster-of-paris, and loam mixed with cow hair, and pieces of wire-netting freely interspersed to bind it together: the core may be an iron skeleton covered with a similar mixture, or it may be a sand core; while the pattern is produced entirely in modelers' wax.

The *cire perdue* process is a favorite method of making statuary bronzes, but, so far as I can learn, there is no settled system of carrying it out in detail. Artists follow their own inclinations. The Belgian school favors the casting of the object complete at one operation, some making a core skeleton first and modeling the wax upon that; others modeling the full pattern and shaving the thickness off. By both of these methods the pattern is destroyed, and should anything go wrong with the cast, the work has to be done all over again. The French method known as *Le Moulage Francaise*,—which by the way, is a plaster-molder's method applied to sand—favors the casting and building of the monument in pieces, which are afterwards bound together by means of screws, dovetails, and "burns," into the complete design. Mr. White in this case adopted a combination of the French and Belgian methods of ornamental founding, by which he has the advantage of a permanent pattern-mold and a complete design, in case of mishap, or a demand for duplicates.

To describe his process from the beginning: A plaster pattern-mold is "pieced" from the clay model, with the joints and drawbacks interlocking, so that each piece can be fitted into position without supports; a thickness of wax is pressed into these pieces and the pattern is built up with them. This sounds quite simple, but when I tell you that the pieces required to model the group shown in the illustration, numbered 369, the need for some more convenient method of dealing with undercuts and intricacies than the false cores and drawbacks of ordinary foundry practice will be understood and at the same time one will be able to appreciate the advantages of a permanent pattern-mold for the wax model, in event of any misfortune happening to the casting.

After all the pattern-mold sections were completed, the clay model was broken down and

preparations were made for building up the wax model in the pit, which was 12 feet diameter by 7 feet deep. A brick base, larger than the base of the statue, was laid out and covered over with a good thickness of "core cement"—i. e., plaster-of-paris and loam. When this was set it was covered with sheets of wax the desired thickness, 3-16-inch in this case, and then the sections of the prostrate figure were run and pressed out of the pattern-mold and pieced together on the base. At suitable intervals the hollow space inside of the wax shell was filled up with "core cement," strengthened with rods and nails, and vented with paper tubes. The upright figure received attention in much the same way. When the wax model was completed, provision was made for the wax to run out at two sides of the base, and also for the metal to run in at convenient intervals. There were four main runners and two risers in this part of the casting.

A frame of rough pine was then fitted over the whole thing, taking its rise from the overlapping brickwork of the base. Two men were kept busy mixing plaster, while the artist spread the stuff and put in supports to build the mold. The latter operation is very much the same as the foundry method of spreading loam, only, being plaster, in this case, it sets much quicker and requires more alert and skilful handling. When the plaster was throroughly set, the next consideration was the drying of the mold and the burning out of the wax model. A kind of brick kiln with three fireplaces was built all round the mold and set alight. For five days and nights the fires were fed, buckets being placed in position to receive the melted wax. And here we have an object lesson on the drying of molds. The dry-sand molder has a wholesome dread of the result if his mold gets "burned;" while the *cire perdue* molder is forever afraid his plaster has not burned enough. The one fears that the mold may crumble away before the cutting action of the metal, the other that the metal may be repelled by a too close or impervious mold. The firing has had the effect of transforming this plaster mold into a mass of *porous* plaster with a sandstone like appearance, eminently suited for the reception of molten metal. The day following ceasing of firing the red-hot bricks were torn down and cast aside, the pit was rammed up, the melting furnace was put in order, and while the metal was melting, the basin, which in this process is made large enough to hold the entire quantity of metal required for the mold, and the runner connecting from the spout to the mold were made ready. Two plugs were then fitted into the down runners and all was ready for the furnace to be tapped and empty its ton of bronze into the basin. I had a peculiar feeling about drawing those plugs to let the metal into the mold. This was my first experience of *cire perdue* work and I must confess I was none too sanguine. However, the mold stood like a rock on fire, and, but for a gentle heave in the risers at the finish, a molder would have thought it was an ordinary cast without the ladle. I need hardly describe the making of the bust for the upright figure, or the fitting and burning of the same, as these things are quite easy to understand, after the first and most difficult part has been explained. JOHN F. BUCHANAN.

Foundry Management.

It is not to be wondered at that the younger element connected with our jobbing foundries, or shops turning out miscellaneous machinery castings, is clamoring for better methods of ascertaining the cost of castings, and that they are devising all kinds of time cards and cost sheets to determine this, for there is no industry in this country which has been so poorly managed for many years, as this class of foundries, and in many instances it is a wonder that shops of this character did not cease to exist years ago. While other branches of the foundry trade, such as stove, radiator, and other specialty shops have devised economical systems of management, which have been in operation for years, the jobbing foundries have made practically no advancement in this direction, except in a few scattered cases.

Not only have these foundries no system worth mentioning for determining the cost of castings, neither do they have any economical system of melting or molding, and notwithstanding the fact that the iron is not required to be as hot for heavy as for light castings, and the molder can turn out more pounds of heavy than light castings, yet in many instances melting and molding costs more per pound for plain ordinary green sand castings made in the jobbing shops, than these items amount to for stove plate. The reason for this is that there is an almost absolute lack of system.

Fuel and iron are thrown into the cupola without being weighed, melting is slow, iron hot and dull by turns, and seldom melted of an even temperature throughout a heat; scarcely two heats being melted alike in a week. The melter is not always to blame for this condition of affairs, for in many of these foundries no scales are provided for weighing cupola stock, and there is no regular time for putting on the blast.

As a general rule the blast is put on when the molders are ready. The melter may light up the bed in his cupola so that melting should begin at 3 o'clock, while the molders may not be ready until 4. About that time an order may come in for a casting, which is in a hurry, when the blast may not be put on until 5 o'clock and even later. By this time the bed is burned up to a great extent and more fuel must be added. Perhaps the melter adds too much or too little, and uneven melting with more or less dull iron is the result. The next day the cupola tender may light up his furnace so that the same will be ready for the blast at 4 o'clock when the molders may be ready at 3, in which case the blast is put on to burn up the bed, so that this may be ready for charging in a hurry and the result is that much fuel is wasted. The melter seldom knows two hours in advance at what time the blast is to go on and he cannot prevent this waste of fuel. This is the common practice as I have observed it among the jobbing foundries, although in the larger of these, they are compelled to be a little more regular in beginning melting, so that pouring off may be complete before quitting time.

Now all of these things are different in stove foundries where there is a certain time for putting on the blast and melting begins at a certain period no matter whether the molders are ready or not. One or two dilatory molders, or a belated pattern, is never allowed to hold back the blast and keep a foundry full of molders waiting for iron. How often does this same casting, which is wanted in such a hurry, and for which the blast is held back an hour or more, lie around the foundry or machine shop for days and sometimes even weeks? How frequently such castings are rushed in at the last moment, not because they are actually wanted on the spot, but because the management believes it can, by this method, get a little more work out of the men than otherwise would be the case.

The question arises, do molders turn out a better day's work when there is no regular time for putting on the blast? The answer must be that they do not. There is no inducement for them to have their day's work finished at any given time, but on the other hand there is an object in them not doing so, for they know that if they are through by, say 3 o'clock, and the blast is to be held back until 4 or 5, that they will be given another pattern to mold, or sent to help out another molder in finishing his day's work. Whenever it is near the time when the blast should be put on, and when the molder considers that he has done a day's work, he begins to waste time and keeps it up until melting begins.

The day for this kind of foundry practice has gone by, as there are too many foundries in which they have a regular time for putting on the blast, and the molders their regular day's work to accomplish. In these shops the molder can depend upon getting home at a certain time every day, and a good mechanic will not work in the happy-go-lucky jobbing foundries, unless he has a smaller day's work to do or can command better wages there, than in a shop which is run regularly. All foundries will find that by having a regular time for putting on the blast they will be able to melt iron with less fuel and have hotter and better iron for their castings; they will have better control of their molders, turn out a larger day's work per man, and be able to produce castings at a less cost per pound.

In many of the jobbing foundries there are no regular gangways, molding floors or sand heaps; instead the entire foundry floor is made a gangway, molding floor, flask yard, or cleaning room. Flasks are thrown any place when the molds are shaken out; castings are cleaned and cores knocked out wherever found; burned sand from castings, core sand, scrap, gates, gaggers, etc., are mixed with the molding sand and trampled down until the foundry floor is two or three feet above its proper level, and tons of molding sand and iron are wasted or lost. A few molders who are making a number of castings from the same pattern may manage to keep a floor or sand heap, while they are turning out that particular order, but the high priced molder who can make anything, and is given a different pattern almost every day, generally finds that he has to hustle for a new floor or sand heap regularly, as the floor that is large enough for one pattern may not be so for another. Flasks, bottom boards,

patterns, core plates, flask weights, etc., have to be piled up or carried out to get floor room. The floor itself has to be dug up and gates, gaggers, and scrap thrown out. Lumps of hard dried sand from previous molds has to be broken up with the back of a shovel and cut over a number of times or riddled to get a sand heap which is fit to work with. All of this takes time and it frequently happens that a high priced molder spends more time in getting ready to mold a piece, than is actually consumed in molding it. The managers of these foundries are generally hustlers; in fact, they have to be hustlers to prevent themselves from being lost in their own shops.

Passing from these foundries to the so-called "Modern Jobbing Shops" we find the latter laid out with gangways, molding floors, equipped with modern cupolas, traveling cranes, etc., but very often the gangways and molding floors are hard to find except upon the drawings for the plant. The floor of the foundry may be so completely covered with patterns, flasks, bottom boards, core and loam plates, castings, etc., that the traveling crane certainly becomes an actual necessity, for were it not for this modern invention it would be impossible to get iron from the cupola to one-half of the molds, and many a casting could not be gotten out of the foundry at all. These descriptions of the old as well as the modern foundries may appear to many readers as impossible of existence at the present time, but I will assure them that I visited several hundred foundries during the past year and the conditions described fairly represent the management of fully 50 per cent of these. Not only was this kind of management found in the small foundries of the country districts, but also in large cities and towns, and in many cases the larger foundries presented the worse condition.

I am aware that in many of the jobbing foundries a feeling bordering on contempt exists for the stove foundry and stove molders in general, but the management of many of the shops doing a heavy class of work might learn a great deal by visiting a stove foundry, where they will find a system and management suitable for the class of castings being turned out. In these shops they will find gangways laid out, each molder retaining possession of a certain floor and sand heap, which he takes pride in keeping in order. Scrap is carefully removed from the top of the molds before these are shook out, and thrown in the gangway. The sand is carefully knocked from the castings and the latter placed in neat piles along the gangway. The sand is tempered, cut over and the heaps neatly trimmed. When the day's work is over the floor is cleaned up and every care is taken to keep the sand heap in the best possible condition for molding. After the castings are removed to the cleaning room the gangways are cleaned up and the iron recovered placed on the charging scaffold to be remelted. In short, in stove foundries everything is cleaned up daily and the shop kept in perfect order.

MOLDING FLOORS.

In many of the jobbing foundries the entire molding floor is composed of molding sand to a depth of several feet, and so arranged that patterns may be bedded in the floor. The bedding in of work is a hobby with many of these founders or their foremen; in some instances nearly everything being molded after this fashion. While there is no doubt that many castings can be molded more economically by this method, the vast majority can be made more perfect and at far less cost in a complete flask.

Where castings are made in complete flasks the sand floor is not at all suitable, for it is almost impossible to keep this kind of a floor level. A molder in preparing his sand heap will cut up the floor more or less, unless he is very careful, until he has his sand heap in a hole. If he is a good mechanic he will level up every flask, but in many cases a large amount of sand has to be placed under the bottom boards for this purpose, which necessitates the tempering of a great deal more sand than is required for molding. Considerable time is required to do this unnecessary work, and the molders' output is correspondingly reduced.

A careless or poor molder will not go to the trouble to level all his molds and many castings are lost or strained through this not being attended to. All of this extra work, loss of time and imperfect castings can be prevented by putting in a permanent hard clay or cement floor for such work as is made in flasks. Upon this kind of a floor a mold will always be level when rolled over and may be quickly raised at one end or side when needed, by placing a limited amount of sand under the bottom board. Such floors may be placed in one part of the foundry, and other parts left with a sand floor for bedding in castings, where this is deemed expedient. With a solid floor a

molder's output will materially increase and better castings result.

GANGWAYS.

A wide, well paved gangway takes up no room in a foundry which can be utilized to advantage. In such a gangway castings may be placed as they are shaken out of the molds and the molding sand may be kept free from coming in contact with burned sand, core sand, rods, scrap, etc., besides it will facilitate the cleaning of molding floors at the end of each day's work. Flask weights may be placed at the side of the gangway where they will interfere with no one. When no longer wanted, the flasks may be placed there, to be later removed to the yard. When any material is wanted for a certain floor it may be readily brought in without interfering with others, while with no gangways, one-half of the molders in the shop may have to stop work every time a flask is taken in or out. The carrying of molten iron is greatly facilitated by a broad, clean gangway in which the men do not have to dodge around sand heaps, flasks, molds, etc., with ladles full of iron. Besides all of this, the legal responsibility for injury to workmen is greatly reduced by providing clear gangways.

FOUNDRY WINDOWS.

The management of many foundries do not appear to realize that windows are placed in these for the purpose of admitting light, and there is many a shop, the windows of which have never been cleaned once during its existence. It is only a short time ago since I visited a foundry which had been in operation for a number of years under this kind of management. It was 10 o'clock in the morning on a clear winter's day when I entered this foundry, and I was surprised to find gas lights burning in various parts of the shop and fully one-half of the molders were using oil lamps in order that they might see how to finish their molds properly.

Looking around I soon discovered the reason for this condition of affairs. One side of the foundry had been provided with a sufficient number of large windows to give plenty of light, but these were so covered with oxide of iron, smoke and dirt, that they only furnished light for a few snap molders, working directly under them. A number of small windows had been placed on the other side of the foundry over the core ovens and at the side of the cupola scaffold, but these were so thoroughly covered with smoke and dirt that it was only by close observation that they could be detected. The sides of a ventilator on the roof extending the full length of the shop were entirely of glass, but one would scarcely have realized this fact from the amount of light admitted.

It was very evident that none of these windows had been cleaned in years, as they had become so heavily coated with oxide of iron, dirt and smoke that very little light was admitted to the foundry and gas and oil lights had to be used throughout the day. The cost of cleaning these windows would probably not have been greater than the cost of oil and gas burned for one or two days, yet, no one seemed to have given a thought to this subject. Now this foundry is not the only one in which conditions such as described prevail; in fact, it is a rare thing to find one with clean windows in many parts of the country, although in many of the foundries in the New England states windows are regularly cleaned and curtains provided for keeping out the direct rays of the sun during the summer months.

The cleaning of foundry windows with soap and water is not an easy matter after they have once become heavily coated with foundry dirt, for the oxide of iron deposited upon the glass can only be removed to a limited extent with water. However, this substance may be readily removed by means of a weak solution of nitric or sulphuric acid, applied with a swab, after the windows have been washed with water to carry away other dirt. After once being thoroughly cleaned in this way, the windows may be kept clean by regularly washing them with soap and water, and the management of every foundry will find it cheaper to keep their windows clean, than to compel their molders to work with the aid of electric, gas or oil lights.

The only means provided for heating many foundries during the winter months are stoves or open fire pots, placed in gangways or upon the molding floors. These pots are seldom provided with pipes or connected with chimney flues and smoke frequently poisons the atmosphere, smoking the windows, obscuring the light and blinding the molders, while they only provide heat for a limited space. Sand is dried out in one part of the foundry, while it freezes in another, and the molders cannot keep themselves or their sand in a condition to do a full day's work.

These stoves consume a great deal of fuel

and make a considerable amount of ashes, more or less of which gets mixed with the molding sand, rendering it worthless. All of these nuisances may be abated, much fuel and labor saved, and the foundry more evenly heated by passing exhaust steam from the engine through pipes placed around the foundry walls under the windows, where they will take up very little room that can be utilized for any other purpose. These pipes, which should not be less than four inches in diameter, may be cast in the foundry, and their cost is but little more than what it would take to make stoves, and the saving of fuel and labor will more than pay for them in one season, besides increasing the output of the foundry by keeping it at an even temperature and the sand in good condition for molding. Many foundries are heated in this way.

CUPOLAS.

It is surprising how many old fashioned low cupolas with high tuyeres are still in use, many of which are not more than seven or eight feet from the bottom plate to the charging door. I recently received a letter from a western foundryman who stated that his cupola was only five feet to the charging door, with tuyeres fourteen inches above the bottom, and he wanted to know why this did not melt faster and make hot iron.

With a bed reaching eighteen inches above the top of the tuyeres only about twenty-four inches were left for iron and fuel below the charging door in this cupola. In many of the seven and eight-feet cupolas, tuyeres are placed from eighteen to twenty-four inches above the bottom, leaving only from three to four feet for charges of iron and fuel. So great is the escape of heat from these cupolas that a hand cannot be placed in them for an instant at the door, when in blast, and in some cases the escape of heat is so great that it is difficult to keep them filled with stock after the blast is turned on; while with a cupola of a proper weight, a man can stand in it upon the stock so far as heat is concerned, when the cupola is melting ten tons per hour.

Heat in a cupola is only produced at the melting zone, and from this point it passes upward through the stock, placed in the cupola for melting. In a high cupola a sufficient amount of stock can be placed therein to absorb practically all the heat escaping from the fuel, as this is consumed in the melting zone, before it reaches the charging door. In this way all the heat may be utilized in heating the stock and preparing it for melting before it settles into the melting zone, and this will result in fast and economical melting being done. In a low cupola a sufficient amount of stock cannot be placed therein to absorb all the heat and therefore this passes up into the stack, and as a result more fuel is required and melting is done slower than in a high cupola. Many of these old style cupolas waste more fuel and time in a year than would pay for a modern cupola, but a new cupola would be a bill in one lump and a hard one to pay; while the extra fuel and loss of time comes in dribs during the year and are not noticed by the management.

SCAFFOLDS.

Many of these old cupolas and also some of the modern ones have the old fashioned small scaffolds with scarcely sufficient room upon them to hold stock for one heat. In many cases the only means provided for handling this is by lifting or throwing it, a piece at a time, upon a platform and again handling it from there to the scaffold. The stock has first to be placed upon a barrow and wheeled to the platform from different parts of the yard, and then it must be handled two or three times more before it reaches its destination. All of this takes time and labor and two or three men are required to do the work that one should do with the help of a properly constructed elevator. At other foundries a runway is constructed so steep that it is difficult for one man to wheel an empty barrow upon it and more labor has to be employed than is necessary. At one shop I recently visited the only means provided for getting upon the scaffold was a movable ladder, and stock was gotten up by means of a windlass and rope; the man after attaching this to the barrow had to climb the ladder and lift the stock with the windlass. Then he had to take off the load, a piece at a time, lower the barrow and climb down the ladder for another load. All of this took time and a full day was required to get up stock for a small heat, and when the blast was on, extra help had frequently to be furnished. Such a foundry would soon save a sufficient amount of labor to pay for a modern hoisting apparatus to do its work.

FOREMEN.

In many foundries the foreman is required to do a day's molding as well as acting as foreman. Such a man is not a foreman. He is only a molder, who fills the place of a foreman and pretends to look after things, for this

is all he can do if he is to do a day's, or part of a day's work of molding. Such a foreman is of no value except in a foundry employing only one molder, but we frequently find foremen of this class in charge of foundries giving work to ten or more molders. In a jobbing foundry of this size a foreman has all he can possibly do to attend to this number of molders, if he looks after them properly, without ever putting a rammer in the sand.

In a foundry of this kind employing twenty-five or more molders, where many patterns and flasks are changed every day, and the majority at least once a week, the foreman has more than he can do, and do it properly, yet, we frequently find a single foreman in charge of fifty or a hundred molders and he seems to be getting along all right, but at what cost does he do it? He has no time to look after each molder or his work, as his time is principally devoted to some particular job, in which the management is especially interested. This he makes a success of turning out and is pronounced a smart man, while probably two-thirds of his molders are not doing half a day's work.

The "foreman problem" is one to which entirely too little attention has been given, and it appears to have been solved by only a very limited number of foundrymen, and these are the only ones who are really making a success of the business at the present time. The first and most important matter to be considered in this connection is, what are the duties of a foreman? They are numerous and varied, and in no other industry has a foreman so many problems to solve daily as has the foundry foreman of a shop, where patterns are constantly being changed and new ones received.

When an order comes in for a casting, it is the foreman's duty to have core boxes and patterns looked up, to see if these are in good condition and that the cores are made. He should have the pattern placed upon the molders' floor, together with a suitable flask, properly barred for molding the casting. It is within his sphere to have cores properly made, and see that these are correctly set in the mold, and when this is closed to see that it is properly clamped or weighted, and iron hot enough and of a suitable quality provided. All of these things a molder has a right to demand, for they are beyond his control, and if not furnished, he should not be expected to turn out a full day's work. How does the foreman in charge of fifty to one hundred molders do his work? When he receives an order for a casting, he sends his pattern carrier to find the core boxes and patterns, gives the core maker a core box, and a molder the pattern. The flask carrier is next sent to find the flask. This individual lays his measuring stick over the pattern, first one way and then the other; then he goes out into the flask yard and brings in the first flask he finds which is large enough. He pays no attention to the bars of same, for he does not know anything about these. The foreman probably never sees either the pattern or the flask, and when the molder goes to use these he finds that the pattern is warped, sprung apart or rough, and double the time has to be spent in finishing the mold, than would be required if everything was in proper condition.

The flask is probably entirely too large for the pattern, and is not barred to suit this; when it has to be sent to the pattern or flask shop to be fixed up while the molder waits for it to be brought back, or else he is compelled to go at it himself with an old saw and a dull hatchet. When he finally has the bars trimmed so that they will not touch the pattern, he has to clay wash these and place in the flask one or two hundred gaggers in order to hold the sand in place. May be these same gaggers have to be dug out of the sand at the back end of the floor or picked up all over the foundry.

When the molder is ready to set a complicated lot of cores he does not know how these should be placed in the mold, and after spending considerable time trying to make them fit, probably tearing the mold in doing so, he finally sends for the foreman and waits until he eventually comes around. Likely as not the foreman knows no more about the cores than the molder, and therefore the pattern maker is called into consultation and possibly the draftsman has to be hunted up; all this time the molder is standing around producing nothing.

When the cores are finally set in the mold, the casting may be lost through these having become damp by standing around several days before being used. Many times the molder finds he has no clamps or weights suitable for the flask, and he has to hunt the foundry over for these. When called upon to take iron for his mold, he has no authority to decide whether this is too hot or dull for that particular casting. The foreman is not at hand, and the iron has to be poured as it is. The

molder after working all day only turns out a half day's work for the reason that he has only been permitted to work at molding about one-half of his time, and even what he has accomplished may be lost from one cause or another for which he is not directly to blame. Every molder in a large foundry does not have all of these troubles to contend with every day, for many of them are engaged on regular work, but those who have to change frequently know more or less of the difficulties referred to above, and are aware that a great deal of time is lost which should be employed to advantage in molding.

Even where molders are working on regular work they are in many instances not enabled to handle this to the best advantage for the reason that their patterns are not kept in proper conditions, flasks are too large and not made to suit the casting, and the neglect of many other details, which should be looked after by the foreman, results in more time being required to make a finished mold than is necessary.

The management of one of the largest and most successful foundries in this country made a thorough investigation of these matters and after doing so placed a separate foreman over the core room, cupolas and every ten molders in the foundry, with a general foreman over all. These foremen were not placed in charge for the purpose of driving the molders or doing laborers' work, but they were to see that every helper did his work as it should be done, and that each molder had at hand everything necessary to enable him to do a full day's molding, without being required to lose time waiting for patterns, flasks, cores, or doing such laborer's work as hunting gaggers, flasks, weights, clamps, etc.

The management informed me that this system had enabled them to almost double the output of castings without increasing their working hours or labor of the molders, and more satisfactory castings were made than when the shop was under the charge of one foreman. This system has now been in operation in this foundry for a number of years and has given satisfaction to both the management and the employes. In a number of other large foundries I have visited, separate foremen have been employed for the core room, loam work, dry sand work; and the green sand foundry has been divided into sections, with a foreman over each and a general foreman for the entire foundry. This appears to give better satisfaction than where a shop is presided over by one foreman and one or two assistants; for by this system the duties of each foreman can be accurately defined and he can be held responsible for anything which happens in that section of the foundry of which he has charge, while under the old system no boundary lines could be drawn and no one could say where a foreman's duties began or ended.

EDWARD KIRK.

Among the Foundries.

The Eastern Steel Foundry Co., recently incorporated, will locate its plant at Eddystone, Pa., where a foundry 250x550 feet and a machine stop 113x250 feet will be erected.

The name of the Fort Wayne Foundry & Machine Co., of Chicago, has been changed to the Chicago Car Wheel & Foundry Co.

The Gowland Mfg. Co., Philipsburg, Pa., manufacturers of mill and mining machinery, is erecting a new plant, which includes a foundry.

Plans for a foundry 80x400 feet have been prepared for the Manufacturers' Foundry Co., of Waterbury, Conn.

The Philadelphia Foundry & Machine Co., Philadelphia, Pa., will erect a new foundry building 60x120 feet, to be especially equipped for handling loam work and the heavier class of castings.

The Macgowan & Finigan Foundry & Machine Co. has been incorporated at St. Louis, Mo., with a capital stock of $50,000 by P. S. Macgowan, H. P. Finigan and W. McB. Smith.

B. F. Motzer, for several years foreman of the Stoever foundry at Myerstown, Pa., has formed a partnership with Fred Wunderlich and established a foundry at Lebanon, Pa., under the name of the Washington Street Foundry.

The Independence Foundry Co., Independence, Mo., is erecting a new and larger plant.

The I. B. Rowell Co., of Menomonee Falls, Wis., has been incorporated with a capital stock of $10,000 by George W. Rowell, Walter T. Camp, C. K. Schlofer and H. H. Rowell.

The Burlington Foundry Co., Burlington, Kansas, succeeds to the business formerly carried on by G. W. Reams & Sons. The officers of the new concern are: G. W. Reams, president; H. L. Jarboe, vice-president; and Ara W. Pratt, secretary and treasurer. The

plant will be enlarged throughout and additional machinery installed.

The Marshall Car Wheel & Foundry Co., Marshall, Texas, is building an addition, 50x75 feet, to its gray iron foundry.

The Bair & Gazzam Mfg. Co., of Pittsburg, Pa., will erect a modern plant, for which a new site has been purchased.

The Crown Iron Works Co., of Minneapolis, Minn., has begun the construction of a new plant, which will include foundry, machine and blacksmith shops, together with power and office buildings.

Arthur J. Cleveland, of Minneapolis, Kansas, will rebuild his foundry, which burned some time ago.

An addition is being made to the brass foundry at Plainville, Conn., operated by the Estate of Burwell Carter.

The Indiana Foundry & Machine Co. has been organized at South Bend, Ind., with the following officers: President, J. Bergan; vice-president and general manager, A. A. Forsyth; secretary, W. N. Bergan; treasurer, F. L. Dennis. A plant will be secured at once and fitted up for the manufacture of a number of hardware specialties, in addition to which a general jobbing business in iron and brass castings will be carried on.

The Barberton Foundry Co., Barberton, O., has been incorporated with a capital stock of $10,000 by E. A. Genet, A. P. Felzlaff, Charles Guff, Louis P. Wenzel and Edward Gross Miller.

Among other extensions contemplated by the Olds Motor Works, of Lansing, Mich., is an addition to its foundry 70x150 feet.

The Snyder & Baker Stove Works, Belleville, Ill., will increase the capacity of its plant.

It is announced that the Westinghouse Electric & Mfg. Co. will increase the foundry capacity of its Cleveland, O., works, by the removal of the machine shop equipment at the latter point to the new works now building at East Pittsburg, Pa., and the conversion of the Cleveland machine shops into an additional foundry. In this connection it is stated that H. W. Johnson, foundry foreman of the Pratt & Whitney Co., Hartford, Conn., has accepted the position of assistant to Superintendent Tyler, of the Westinghouse Electric & Mfg. Co., and will assume the management of the company's Cleveland foundries about June 1st.

The Massey Machine Co., recently organized at Watertown, N. Y., with a capital of $60,000 for the manufacture of machine tools, will erect a foundry and machine shop, 100x150 feet.

The Humphreys Mfg. Co., Mansfield, Ohio, is building an extension to its foundry 56x60 feet.

The Gould Coupler Co. will at once erect an open-hearth steel plant for making steel castings adjoining the company's malleable iron works at Depew, N. Y. The principal building will be 252x390 feet. The latest devices for handling both raw material and finished product will be embodied in the equipment.

Charles Knotts and Royal Wolfe have started a foundry at Lancaster, O.

The Marine Engine & Machine Co., Harrison, N. J., intends to enlarge its foundry in the near future.

The soil pipe department of the Beggs Pipe & Foundry Co., Birmingham, Ala., has been taken over by the Southern Pipe & Foundry Co., recently incorporated with a capital stock of $35,000. The plant is new and additional machinery has been installed, bringing the capacity up to 30 tons of finished product daily, consisting of soil pipe and fittings exclusively.

The Anderson Chilled Plow Co., South Bend, Ind., whose plant was recently destroyed by fire, will rebuild on the same site. The new plant will be larger than the old and will be fireproof throughout. The main building will be 80x420 feet.

The Pittsburg Brass Foundry Co., recently organized in Pittsburg, will build a brass foundry in that city.

The Capitol Casting Co., recently incorporated at Lansing, Mich., with a capital of $25,000, succeeds to the business hitherto carried on by Chas. S. Keith, who remains as secretary and manager of the new concern. Associated with him are John A. Weston, O. A. Jamison and O. D. Hardy.

Herpel Bros., of Reynoldsville, Pa., will erect a new foundry and machine shop 40x80 feet.

The Keystone Mfg. Co., of Sterling, Ill., founded nearly fifty years ago by Thos. A. Galt, has passed into the hands of E. K. Butler and H. B. Utley, both of whom were formerly connected with the McCormick Harvesting Machine Co., of Chicago.

The Central Brass Foundry Co., of Cleveland, O., has increased its capital stock to $50,000.

The Kelly Foundry & Machine Co., of Goshen, Ind., is erecting an additional foundry 50x120 feet.

The Western Malleable & Gray Iron Mfg. Co., of Milwaukee, Wis., has increased its capital stock to $100,000.

The Wellman-Seaver-Morgan Engineering Co., of Cleveland, O., and the Webster Camp & Lane Co., of Akron, O., have consolidated their interests under the name of the Wellman-Seaver-Morgan Co., which has been incorporated with a capital of $3,000,000. Steel castings and patterns for the two companies will be made at the Cleveland plant, and the gray iron castings will be made at Akron. The two plants are well adapted to work together. Both are being operated to their full capacity and extensive additions will be made. The officers of the new company are as follows: President, S. T. Wellman; chairman of board of directors, John McGregor; first vice president, S. H. Pitkin; second vice president, John W. Seaver; third vice president, George H. Hulett; general manager, Charles H. Wellman; secretary, Thomas R. Morgan; treasurer, Albert D. Hatfield.

Louis H. Flum, late superintendent of the Vulcan Foundry & Mfg. Co., Hamilton, O., has formed a partnership with his two brothers, John, Jr., and Richard, under the name of Flum Bros., and will build a general jobbing foundry, contract for a building 60x150 feet having been let.

The St. Louis Stove & Mfg. Co. has been formed at St. Louis, Mo., by Wm. A. Beatty, John C. Bulis and James M. Sutherland. The capital stock is $50,000.

The Ford City Foundry & Machine Co. has been organized with a capital of $200,000 for the purpose of erecting a plant at Ford City, Pa.

The Union Steam Pump Co., Battle Creek, Mich., has under construction a new foundry.

The Union Mining Co., Mount Savage, Md., will erect a foundry 41x100 feet.

The Richmond Foundry & Mfg. Co. has been organized at San Francisco, Cal., with a capital of $100,000.

The new foundry of the Ingersoll-Sergeant Drill Co., at Phillipsburg, N. J., is nearly completed.

The Trojan Foundry Co. has been incorporated to do business at Troy, N. Y., by Thos. C. Boswell, Sam. L. Taylor and George W. Wilcox.

Pardee Bros. & Co., of Lattimer Mines, Pa., will build a foundry and machine shop during the summer, where all repair work for their collieries will be made.

Cost Accounting in the Foundry.

If the real value of cost accounting lay only in ascertaining the accurate cost of each individual article manufactured, many of the objections made against it, and the criticisms of its usefulness would be of greater weight. This, however, is but one of its functions and, looked at in its true light, a great deal of such criticism as that contained in an article which appeared in THE FOUNDRY of February last loses its force, being based on the narrower view of what "Cost Keeping in Foundries" implies.

Over and above obtaining individual records a cost system in a foundry, as in any other productive organization, should so analyze and compare the cost of output as to bring to immediate attention and indicate the cause of any abnormal change in the relation which any element of cost may bear to any other expenditure, or to the weight, quantity or value of the product. While the attention given to details and the elaboration of forms in many descriptions of cost systems may make them appear complex, it must be borne in mind that in these days of card indexes it is in many cases a much simpler matter to operate the systems spoken of than to describe them. If cost accounting is of any practical value in the foundry—and this can only be determined after a fair trial, the opposition of the workmen carries no weight as an argument against its introduction. It would be as reasonable to admit that the introduction of the molding machine or the many other labor-saving improvements of recent years should not have been insisted upon by the management against the wishes and judgment of the men, as was undoubtedly done in many, if not in the majority, of cases.

That the invention and introduction of such systems as those criticised in the article referred to are the work of the younger element in the business may be admitted. Much of the best work of today in all lines of industry and commerce is the work of this element and results from changed conditions of business necessitating changed methods, and also requiring closer knowledge not only of costs, but of details of costs than was formerly called for or required. The claim that, even supposing a perfect system of costing in the foundry is obtained it will be of no value because each day will be simply a repetition of the previous day's records, should be a strong argument in favor of a most thorough cost system. The end of cost accounting is cost reduction,

and in these days it is not sufficient that costs do not increase—a lessening of costs is the object sought. In direct proportion to the detail to which the expenditures representing any element of cost of production are known and are capable of being compared with that part of the output on account of the manufacture of which each was incurred, in just that proportion will the management be afforded opportunity for cost production.

The alternative plan proposed and which will result in an average cost of the entire output, certainly has the advantage of simplicity. It might equally well be applied to other lines of manufacture, but while it would undoubtedly lessen the clerical expenses of a large engineering shop, I doubt if those interested would be satisfied to know only the gross cost of the entire output, or even the total cost of the production of each shop.

To just what extent it is advisable to seek to obtain the costs of individual castings depends on existing conditions and the class of work produced. The main difficulty does not lie in the labor and material actually entering into the cost of the production, but rather in the multitude of indirect manufacturing expenses. In a foundry these are so varied in their nature that to keep accurate record of their relation to each individual casting would appear almost impossible. In the foundry, however, even more than in any other branch of manufacturing, it is in the direction of this element of cost that a thorough cost system will be found of the greatest value. It should point out any undue increase, or any possible economy in any detail of such expenses as shown in their relation to the weight of the output. It can not be denied that it is hard to secure legible or satisfactory clerical work from foundry employes, but with some care in planning practically all such work may be done in the office, leaving to the foundry clerk or foreman only the responsibility of keeping record of the net weight of materials used during each month in the manufacture of the different classes of castings, the weight of each class produced, both good and bad; and as regards time, a time sheet showing to which of certain listed order numbers the time of each employe is to be charged. (It should be clearly understood that classes of castings has reference here only to the quality of the metal of which they are composed, which would possibly necessitate more divisions in a brass than in an iron foundry.)

Assuming that the entire output of a foundry using such a cost system was composed of two qualities, the basis of the system would be each month the number of orders covering the various operations and expenditures for such month. Such a list of orders would be approximately as follows, and would be charged respectively, with: All metal melted to produce castings of each quality (less gates returned)—

All molder's time on machine-castings of each quality—

All molder's time on hand-made castings, each quality,—

Furnaceman's wages and fuel—

All expenses of handling and preparing material and stores—

All small supplies used in the ordinary operations of the foundry—

All labor and supplies for the fettling room, and all general floor labor and superintendence—

Repairs and maintenance of molding machines, and renewals of flasks, tools, etc., used therefor—

Repairs and maintenance of plant, and tools used altogether in production of hand-made castings—

Repairs, maintenance and renewals of plant other than the above—

All expenses in connection with the core room—

Fixed charges—

All bad castings returned. Record to be kept of quality whether hand or machine made, and whether cored or solid. (Bad castings are charged back to bad castings account at full value of similar perfect castings, then transferred to scrap at scrap value, the difference thus showing the dollar and cent loss, and representing an expense of the foundry.)

The output for each month would be divided by the foundry into quality only, this being the extent of classification for which any expert knowledge would be required. It would then be further divided by the department receiving it into machine and hand-made castings, cored or solid; the detail of course agreeing with the aggregate of the two qualities shown by the foundry as having been manufactured during the month. It will then be a simple matter for the office to apportion each of the various expenditures incurred on account of specific lines of output on the cost of such output, only: Such expenses as furnacemen's wages, fixed charges, etc., etc., would be distributed on the

total output, and other expenses as represented by the orders issued would be distributed on the basis of the weight of that line of output to which such expense was properly chargeable.

In addition to these orders when desired, and the size and importance of any casting would justify it, a special order for such casting may be issued and be charged direct with all the labor and material directly expended on its manufacture, subsequently being charged with its pro rata proportion of other legitimate expenses.

Such a system necessitates very little clerical work in the foundry, and, considering the scope and value of the information resulting, not an undue amount in the office. It affords opportunity for close comparison from month to month of each element of cost per hundred pounds of such output as is directly related to that element of cost. It permits of close estimate inasmuch as when figuring on an order for solid castings the records of previous costs of similar articles do not include any portion of core room expenses. Finally, it results in any gain secured by increased or better facilities going entirely towards lessening the cost of such part of the output as is directly affected thereby. Reduce the expenses of the core room and the output of cored castings reaps the entire benefit in the shape of lessened cost per hundred pounds. Put in more molding machines and the cost of machine-made castings benefits by the increased output. On the other hand, let any factor of cost be increased, and the increased expenditure goes directly and in its entirety against the cost of that particular class of production on account of which such increased expenditure is incurred. The result is that the effect of economies or wastefulness shows directly on the cost of such part of the output as they are related to and will be seen at once, whereas if spread over the cost of the entire production they might easily escape detection. KENNETH FALCONER.

Lasting Iron.

There are at least some places where for actual and severe wear steel is "not in it" with chilled cast iron. This is specially true of the shoes of stamp mills. Records show that in cost the following is about the range: Chilled iron, 1; cast steel, 3; ferro-aluminum, 4.2; manganese steel, 4.4; projectile steel, 4.6; chrome steel, 4.8; forged steel, 5.4; Harveyized steel, 7.1.—*American Machinist.*

Foundry Accounting and Methods of Estimating Cost of Castings.*

In common with other manufacturers it is taken for granted that it is essential that the producers of castings should be able to estimate correctly the cost of these and quote a price for same which will enable them to secure work in competition with other concerns, yet at such a figure as will allow them a margin of profit. One drawback in accomplishing this is the absence from our foundries of systems which will enable them to gather in concise form the experience of the past.

There is an inclination when new business is offered to shade the figure at which this has been turned out by other shops. If a founder is anxious for a contract which has been made at the rate of 3½ cents a pound in another foundry, he is likely to believe that if his neighbor has been able to make money at this price he too can turn out the work at a shade below this, and yet have his balance sheet show up right at the end of the year. I have in mind an instance where a founder made a line of castings for some little time, when de discovered that this left too small a margin of profit and therefore raised the price, whereupon the customer took the work to a nearby foundry, where he represented that this had been turned out previously at ½ cent less a pound than had actually been the case. The latter shop accepted the contract at this figure, only to find after a few months that money was being lost on every pound of castings turned out. If this shop had been employing any kind of a system it would have known at once that the castings could not have been made at the price agreed upon and leave any profit whatever.

In the present article we shall confine ourselves to methods related to the jobbing foundry without bringing in items which belong to other departments. It has been my experience in several different lines as an accountant that there are no systems of books, or forms of records, which will apply to every similar line of business, but that each one must make changes which will make them adaptable for his own needs.

Orders for castings should not be accepted without a full knowledge as to their character. When a founder has a set of patterns before him he should be enabled by some sim-

*Synopsis of a paper read before the New England Foundrymen's Association by O. C. Barrows.

ple method to estimate correctly the probably cost of making the castings. Before he can do so, he will need to know five things, viz.: Weight of castings, actual cost of molding, actual cost of cores, if any; cost per pound of iron and cost per pound of all other foundry expenses of whatever nature which we will term "general expense." Knowing these, he will, after adding a suitable margin of profit, be enabled to name a price at which he can produce the castings and be reasonably certain of closing the year with a proper balance upon the right side of the ledger.

Much is said about card systems nowadays and some of these in various forms are very helpful in keeping track of the many items, articles and accounts necessary to the trade. In this paper there is nothing which has anything to do with the regular system of books, and all we will say is, that these should be properly kept in what is familiarly known as "double entry" with the accounts subdivided so that they will show at a glance the purchases and costs of the different articles used.

A special book should be kept for stock received and in this should be entered daily all iron or supplies of whatever nature, received in any department. The clerk should report tickets of weights, quantities, etc., in detail to the office, and when entered upon this book all invoices can be properly checked up without asking any questions except when differences occur in weights or quantities. Pig iron, coal and sand are some of the principal items which should be kept account of in such a manner that all facts relative to them may be ascertained upon a moment's notice. To keep track of pig iron a card should be made out for each sale containing the facts in relation thereto, with name of seller, kind of iron, price, terms, shipments, analysis, deliveries, etc., to be filed in card cabinet under the name of the seller. The opposite side of this card may be ruled for record of deliveries, tons, car numbers, etc.

Another card should be employed to show "pig iron received" and upon this should be entered as soon as advices are at hand, the date of bill, number of car, kind of iron, pounds billed, and file number of the party from whom the iron is purchased. To obtain the proper record this card should be ruled so as to show pounds received, pounds over or under weight, price, freight paid, all of these items to be filled in as the iron arrives.

Another card of a similar nature should be employed for coke when one may readily see at a glance what iron and fuel is in transit, whether received, on dock, when shipped, price, etc., without having to refer to all the invoices from a dozen or more firms.

Another card may be used to keep track of each car of iron as it is received. As each car is entered upon our books it is given a serial number of our own as well as the car number. Such a card may be ruled to show billed weight, actual weight received, price, date and amount used in the cupola, and when the shipment is used up the card should show the quantity over or under weight. A similar card may be used for scrap iron or any other material and can be made to show date received, quantity used and the balance on hand.

Now to ascertain the five things necessary before we can estimate the cost of a casting, as far as weight is concerned this can be easily estimated, near enough for all practical purposes, by rules well known to all. The actual cost of molding is to be determined in accordance with the best judgment and from experience, and the cost of cores is to be found in the same manner. In order to obtain the cost of iron per pound, the iron account cost should be made up monthly from the daily record kept at the cupola by the person in charge, showing the kinds and quantities of pig iron, scrap and sprues melted as well as the fuel used. These amounts figured at the cost of the material delivered in the yard, divided by the number of good castings made for the month, will give the cost per pound of iron for the castings made, although in figuring work on which a price is to be quoted, the market price of pig iron should be taken into consideration. The sprues will be left out in the figures and only taken into account at the annual inventory. The share of general expense which must be borne by each pound of castings we will have to base upon the total of the year or month just passed, having the exact price per pound in detail made up to cover the different classes of labor and office help, supplies and other items of expense.

For the purpose of keeping a record of each individual consumer's work, with the view of showing whether a satisfactory gain is made upon this or not, an order book may be ruled so that it will indicate number of castings ordered, description, weight of single piece or total weight, cost of molding single piece, total cost of molding, cost of cores, etc. When these items are properly figured out and sum-

marized each month one may, by multiplying pounds by cost of iron and general expense, as shown by the previous record for a month or a year, and adding the cost of molding and cores, estimate the total cost. Multiply pounds by selling price and subtract cost and we have the gain or loss. At the end of the year the amounts for each month may be added together, when we have an average for the entire year.

When these facts are entered each month one can see at a glance upon one or two pages the total amount of pounds ordered by each customer, and amount received for same, the cost and the amount of gain or loss. If a customer has several distinct grades of castings these can readily be separated and special information obtained in regard to each. In this way a careful watch can be kept upon different kinds of work, the unprofitable and undesirable weeded out, methods taken to cheapen the cost of producing the balance, and a check upon the method of estimating is constantly kept. While this system as outlined is not claimed to be infallible or applicable, in its present form, to all jobbing foundries, it will prove of general use where the work done is of an average class. With a foundry doing several classes of work it will be necessary with the system here outlined to keep a separate record of each.

In figuring on heavy work one should not add the same general expense per pound as is necessary in figuring light or medium work, as this might result in losing the job, for a foundry running 20 molders on heavy work would melt, say, 20 tons per day, while a foundry turning out light castings and employing the same number of men might only melt 3 tons per day; naturally therefore the general expense per pound will be much more with the light than with heavy castings. However, any difficulty in this connection may be easily overcome by proper classification and attention to details.

The card system may also be made use of in other ways for the purpose of showing results and tabulating information, which while not an actual necessity, may at times be found extremely useful. For instance a card system is a handy way in which to keep a record of every employe, especially those of a skilled class. This information may be filed alphabetically in two separate lists, one including those actually employed in the shop and the other confining itself to those who have at one time or another worked there and later left their positions for one cause or another. Again one may also in this manner keep a record of applicants for work or at least of as many of these as may seem desirable together with other references.

Another use of the card system which should be found very handy in the foundry is in keeping a record, by name of articles, of all supplies, tools, etc., purchased. As invoices are received an entry is made upon the proper card; for instance, if a supply of riddles is purchased a card is made out under the heading of "Riddles" and upon this will appear the date of purchase, quantity, description, price and such other information as it is desired to have a permanent record of. Similar cards are made out for other articles and at any time one can instantly refer to any of these and note every important item in connection with past transactions. At the end of the year the total purchases of all articles are shown at a glance together with whatever variations that have occurred in prices. Another advantage is that at stock-taking time one has prices ready at hand for any article it is desired to look up, as every purchase is here recorded. The card system also comes in very handy for keeping track of the prices of castings and quotations made. As a whole it is very elastic and can be enlarged to any size; old and discarded customer's cards can be taken out and the file kept always fresh and of easy access.

Some criticisms have recently appeared as to the expense of keeping up elaborate cost systems. This will, of course, depend upon the extent of one's business. In a jobbing foundry melting from 25 to 30 tons per day and employing 150 to 200 hands, one clerk a part of the time, in addition to the regular force employed, should be easily able to keep the work well in hand. I believe that, if some such a basis of estimating and keeping cost were in vogue in our foundries, this would reflect itself in better results and a better regulation of prices together with less friction between customer and seller. In such a case the foundryman could feel that he was meeting fair competition and that his success would demand the best facilities, help and modern appliances.

Smith & Caffrey, proprietors of the Phoenix foundry, Syracuse, N. Y., have leased another plant in order to take care of increased trade.

Personal.

C. Y. Nellis has been appointed superintendent of the Brantford, Ontario, works of the Pratt & Letchworth Co.

A. M. Loudon has been appointed assistant to the manager of the West Point Foundry, Cold Spring, N. Y.

Philip Metzger will be superintendent of the plant to be operated by the recently organized American Foundry Co., Toledo, O.

David Black, for the past seven years editor of the *Iron Molders' Journal*, has resigned to accept a responsible position with F. & L. Kahn & Bros., of Hamilton, Ohio. Mr. Black has represented the molders in the majority of conferences which have taken place between that body and the National Founders' Association and his conservative views on many questions won for him favorable prominence. J. P. Frey, third vice-president of the I. M. U., succeeds Mr. Black as editor of the *Journal*.

Deaths.

George Willis Bement, secretary and treasurer of E. Bement's Sons, Lansing, Mich., died April 19, aged 53.

James Woodruff, head of J. Woodruff & Sons, Salem, O., died April 21, aged 86. In 1838 he established the foundry, which is the oldest business concern in Salem.

Irving M. Scott, for many years vice-president and general manager of the Union Iron Works, San Francisco, Cal., died April 28. He was 66 years old.

David Bell, one of Buffalo's pioneer engine builders, died April 20 at the age of 85. He was born in Dumfries, Scotland, and came to this country in 1842.

John McGuire, general superintendent of the Variety Iron Works, Cleveland, O., died recently, aged 46.

Fred G. Mason, general manager of the Novelty Iron Works, Sterling, Ill., died April 23, as the result of a railway accident. He was 49 years of age.

Rheinhardt Scheidler, of Newark, O., was killed in a boiler explosion at his plant April 29.

Back to the Foundry.

Will Jacobs, who retires as night captain of the police force with a splendid record, will go back to work at the Stover foundry. Will made many friends while on the force and the boys wish him well.—Freeport (Ill.) *Journal*.

Common Cast Iron, Hand Iron and Malleable Iron Castings.

It is a very simple matter for any one familiar with the foundry in a practical way, to tell what are the chief characteristics of these three kinds of iron castings; but it is entirely different when they undertake to give an explanation of what causes them to vary so in their character.

Molten iron when poured against a piece of solid iron, as all foundrymen know, will become hardened at the point of contact, and to a greater or less depth according to the chemical composition of the molten iron and the relative size of the solid piece, or chill. Our friend, the molder, will laugh at our supposed ignorance, if asked why the casting is thus hardened, and tell us it is on account of being "chilled." This, of course, is true enough, but the further question of why the chilling of iron causes it to harden will remain unsatisfactorily answered by most molders, and not a few foundrymen. We may now and then find one who is more thoughtful than the average, and somewhat acquainted with the chemical and physical nature of iron, who can tell us that the element of carbon in melted iron is mostly in the combined state, and that by pouring it against a chill, the fluid metal solidifies more quickly, and the carbon remains unchanged. If no chill is used, however, the molten iron cools more slowly, and the carbon separates from the iron into the graphitic state. Carbon in the combined state, he will say, causes the iron to be hard; but graphitic carbon has the opposite effect. This is also all true, but why does combined carbon cause iron to harden, and why does graphitic carbon cause it to soften? It is pretty safe to say that the molders or even practical all-around foundrymen who can answer this question at all satisfactorily are few and far between.

While the writer does not claim to have studied out the exact and entirely correct hypothesis, he believes the following is upon the right basis: Hardness, brittleness, tenacity, flexibility and elasticity are properties depending upon the power of cohesion, or mutual attraction of the particles in a body. The relative weight of iron and carbon is about five to one, hence pig iron containing say 4 per cent of carbon would have about one atom of carbon to five atoms of iron. By quick cooling, or chilling, as has already been stated, the carbon is retained in the combined state, and if we

now presume that each atom of combined carbon exerts a powerful cohesive attraction for the five atoms of iron, and that it is therefore very difficult to separate the combined particles, as by filing, the real cause of hardness is explained.

In addition to being hard, hard or white iron is also very brittle. This brittleness can be explained from the fact that hard iron mixtures, when poured, cool very rapidly and the particles do not have time to come together and place themselves in a natural and regular manner, but on account of uneven shrinkage and cooling are in a state of stress or strain after the metal sets. Crystallization also develops in cooling. The carbon particles in each crystal, as stated above, doubtless exert great attraction for the iron particles, but the crystals themselves do not cohere so strongly to each other, as do the particles in them. The crystals can therefore be readily forced apart, as by a sudden shock or blow.

We find a great change is effected in hard iron castings, when they have been made from a suitable mixture, by the process of annealing. They become soft and flexible, and of greater strength. We are told that this change is wrought by decarbonization, and again that it is caused by the change in the nature of the carbon from the combined to the graphitic state. Both answers may be considered correct so far as they go; but why does the loss of, or change in carbon affect the iron? In the hard iron castings, we have taken it for granted that the particles of combined carbon exert a powerful attraction for the particles of iron in the same crystal, thus causing hardness. By annealing, the crystals are broken up, and the combined carbon is either changed to inert graphite, or is by chemical process eliminated. Instead of the atoms or particles of iron cohering to the carbon atoms and composing crystals, they now cohere to each other. The carbon atoms having been removed altogether, or turned into graphite and isolated from each other by the iron, are now without influence, and the atoms of iron cohering to each other form a fibrous structure which we can bend, file and machine. We can do the last two operations because the particles of iron do not cohere so strongly to each other as they formerly did to the carbon, and are therefore more easily forced apart. This accounts for the change from hardness to softness; from brittleness to flexibility; and the increase in strength of malleable iron over hard iron is accounted for from the fact that, as has already been explained, while the iron and carbon atoms or particles composing each crystal in hard iron cohere more strongly together than do the iron particles alone in the annealed or malleable iron, yet the crystals in the former do not have the cohesive attraction for one another as do their component particles. This can perhaps be explained more readily by comparing the particles to the links of a chain, and several such links representing a crystal. The links are very strongly held together in each chain; so are the atoms in each crystal. Suppose two chains are fastened together by a weak cord; they are readily pulled apart. So are the crystals.

Ordinary cast iron, in many respects may be considered a medium between hard iron and malleable iron. It is brittle, but less so than hard iron, and is ordinarily soft, being even preferable to malleable iron for machining. Brittleness in common cast iron is due to the carbon branching out into crystals of graphite. These crystals separate the iron structure, and thus weaken it. The cooling and solidifying of the molten iron, which, except in heavy castings is very soon done (although not so quickly as in hard iron) also causes brittleness by starting stresses and strains among the particles, particularly where the different parts of a casting are improperly proportioned. That the iron is soft is accounted for from the fact that the carbon does not remain combined, and does not therefore exert such a cohesive attraction as in hard iron. EDW. L. GROVER.

Foundry Tools.

Referring to a paper on the above subject read at the Boston meeting of the American Foundrymen's Association by James A. Murphy, a contributor to the *Mechanical World*, says that but few English molders with any experience in large shops can read this without making comparisons between what are there recommended as handy tools and what are considered up to date in England. The days of wooden beams and wooden flasks or boxes are happily past in this country, and it is somewhat pathetic to read of experienced molders in these days solemnly discussing the question of the best form of "lug" for wooden boxes and the binding of wooden beams. One wonders whether foundries in America have received their proper share of attention at this time of general improvement in tools and appliances for the purpose of saving time and labor.

There can be no doubt whatever as to the benefits which arise in foundries, as in other workshops, by the use of the best tools, and the operation of the Employers' Liability Act in England drives home the fact that money spent on a fair supply of reliable and useful tools is real economy.

Starting with the oldest type of lifting tools, the chain sling, the most useful is that which will best accommodate itself to all the various requirements of the foundry. A very useful kind is that which has no long links, but which is adjusted to any length by simply placing the hook at the desired place. Fig. 1 shows the hook "hitched" to the chain, which it grips completely. These chains are perfectly reliable and are supplied to meet any requirement.

avoided, and the cost of testing and repairing saved. Every chain should be stamped with its outside lifting capacity, and a large margin of safety should always be allowed for surging and sudden strains. In turning over, and in lifting boxes from castings, it is often difficult to judge the strain which will be thrown upon the slings, hence the necessity for a large margin of safety.

A most useful sling for lifting cores or parts of molds which require nice adjustment is that formed by uniting the ordinary chain with the bottle-screw (Fig. 2). The bottle or shackle is provided with right and left-handed screws A, A. By turning the shackle the length is easily adjusted, whether the chain be loaded or light. This is of great importance, as it saves

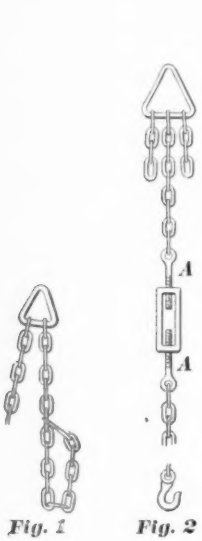


Fig. 1 Fig. 2

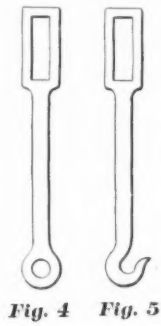


Fig. 4 Fig. 5

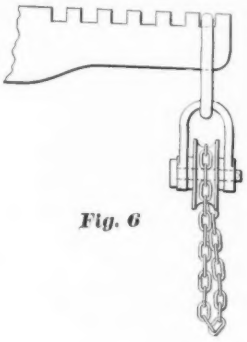


Fig. 6

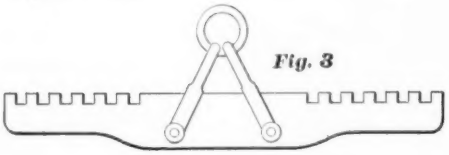


Fig. 3

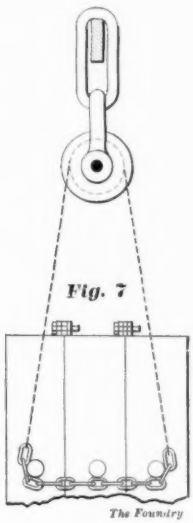


Fig. 7

The Foundry

There are several objections to the old-fashioned slings with their intermediate long links. The scope of adjustment is limited to the number of spaces for hooking into, and it often happens that in taking turns round the runners and risers of castings, or round the castings themselves, the long links will come on a corner or in the "nip" of the turn. In such cases the long links prevent the proper grip of the chain, and the links themselves get distorted and weakened when the strains are heavy.

The most economical manner of working with chains is to have several sets, each set being of different lifting capacity, and to use comparatively strong chains in every case of lifting. Straining and breaking are thus much time and labor in hoisting and lowering.

It will be found very advantageous to have the eyes of all chains made of triangular form, so that they may be used either on or off the beams in use. The eyes should be sufficiently large in the smallest part to fit the hooks of ordinary-sized cranes or travellers.

Next to chain slings, the beam is the most useful means of lifting molds or boxes. When possible, steel or wrought iron should be used for the body of the beam. Cast iron is much used, and with a good margin of safety much cannot be said against it. But there is not absolute safety in its use, whereas in using steel or wrought iron, warning is always given of overstraining before danger occurs; and beams made of the latter materials may, from

their higher tensile strength, be made considerably lighter than when cast iron is used. Beams, like chains, deteriorate very little under fair usage, and in the case of wrought iron or steel beams the first cost may be looked upon as the final cost. Fig. 3 is a good form of beam. It should be graduated by notches as closely as possible to the center, and the notches should be fairly deep.

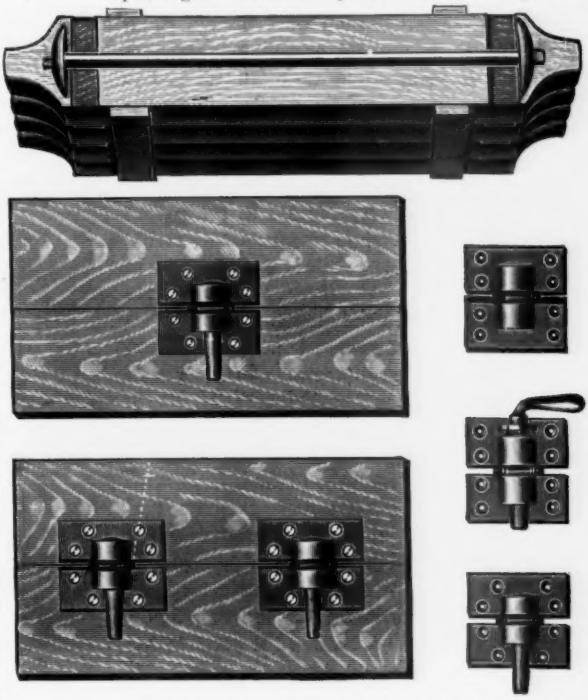
For use with the beam, slings of patterns Figs. 4 and 5 are in common use; but they have many drawbacks, and by far the best are those which combine the endless chain and pulley. In turning over molds of two or more flask parts, the straight sling is very awkward, and it is often more easy to turn over by means of chains and eyebolts or ring bolts than to rig up appliances to counteract the throwing and jerking which occur when only two trunnions are being used. Much room on the floor is required as well as considerable time and labor. With the chain and pulley slings, things go much more easily and quickly. Figs. 6 and 7 show their design and capabilities. When a considerable number of parts compose a mold, and the whole requires turning, the chains are passed over all but the top trunnion. With ordinary care little or no jerking occurs.

Open-Hearth Steel.

Open-hearth steel is usually made in a regenerative furnace, lined with firebrick and having an acid or a basic bottom. A mixture of pig iron and steel scrap, or other highly refined material, is melted to the desired condition. It is then tapped into a ladle, a certain quantity of spiegeleisen or ferromanganese being added either in the furnace or ladle in order that the desired percentage of carbon may be obtained. From the ladle the steel is run into ingots or direct castings. The melted mass, prior to the addition of spiegeleisen or ferromanganese, is termed the bath. Artificial or natural gas, highly heated, is used to melt the pig iron and scrap. In the open-hearth furnaces the percentage of carbon can be readily regulated. In an acid furnace the slag contains usually 45 per cent of silica and upwards, while in a basic furnace the slag as a rule contains less than 20 per cent of silica.

The Diamond Floor Flask.

The Diamond Clamp & Flask Co., of Richmond, Ind., are about to place on the market a floor flask, in which all parts will be made to standard gauges, so that they may easily be put together when they reach the foundry. The



ends are held together by a newly designed pin and socket, the former being made of machinery steel and riveted to the cast iron lug on the plate. The lugs are twins and cast with a break, which holds the ends together, when the whole flask, cope and dray, may be bolted together and the cope barred, thus securing perfect registering of the pins. The pins and sockets are made for use with either tight or loose pins.

Adjuncts as Good as New.

The Wiegand Foundry & Machine shop appears to be a busy place these days. The past week finished up a batch of castings, including the casting of a heavy center piece to a traction engine wheel. There is hardly an adjunct to a machine that this shop will not turn out as good as new.—Monona (Ia.) *Leader*.

The Century Stove & Mfg. Co., of Johnstown, Pa., is preparing to double the capacity of its plant.

Foundry Flasks.

"Castings true to Patterns" is an expression often seen in advertisements of foundries. No doubt many shops come somewhere near fulfilling their promises in this direction and yet it cannot be denied that many castings show more variation than they should. Ramming up a flask, without clamping it together while this is being done, is a fruitful source of difference in the weight of the same casting and of course flasks with light bars, which spring under the pressure of the fluid iron, will produce the same result. Then we have the flask which shifts more or less in the guides and is liable at any time to give us a casting of unequal thickness. While it is customary to blame the molder whenever anything goes wrong this should in the majority of instances be placed upon the owners of the foundry who furnish defective equipment. In a recent issue of the *American Machinist*, W. H. Booth takes up some points in this connection as follows:

"I had occasion recently to find fault with some castings. Certain important parts had come out thinner than the pattern, while other parts were thicker than the pattern. It was set up as an excuse for the error that it was difficult to bring flasks together again exactly as they had been when the pattern was molded. Apparently this excuse was put forward with perfect sincerity by a man of experience and education. He seemed to think that it was a perfectly valid excuse that ought to be accepted without any objection. Indeed he seemed to be quite hurt when I suggested that I expected castings to resemble their patterns very closely. It is possible of course that he had formed a bad opinion of me and thought I knew no better and would swallow his excuse whole. Should these lines meet his eye he will now perceive that I was not quite such a fool as I may have appeared to him. At the same time, while I suggest that this may have been the explanation of his excuse, I believe he really did mean what he said and that he put forward his excuse with perfect *bona fides*.

"When a foundryman tells me that a casting has gone wrong because the core has floated out of place I feel that there is some excuse for this, for the means of holding a core in position are not always very good, and there is a considerable flotation effect brought to bear. But the match of the flask is a different affair. Two boxes held together by pins or dowels at their opposite sides cannot possibly be put wrongly together if the pins are fits in their respective lugs, and if they are not fits why are the pins there? My friend's castings were wrong because these pins could not have been fits. He was hurt because I sneered at them for standing all awry. It was not the hand of the molder that shook, but the pins of the boxes must have been loose; there is no escape from this conclusion. We may be assured that the sand in the boxes, duly filled and rammed, hooked and confined between the bars of the flask, could not be moved ⅛ inch from the place unless the whole broke up; so there remain only the dowel pins that could have gone wrong, and the whole secret of the badly copied pattern must be laid to these.

"It ought to be a very simple matter to lay two halves of a flask face to face and to drill through both lugs at one time, then to put a tight turned pin through the drilled pair and drill the next pair of lugs and duly ream them and then to tap out one lug and screw in a true turned, pointed dowel pin. But this would be too good a job. I believe most faulty flasks are made by molding each half from one pattern, putting dry sand cores into the core print marks of one box and standing the dowel pins in the print marks of the other box as nearly true and vertical as may be. When cast, if the pins enter the holes, well and good; if not, a round-nosed chisel eases out the one hole on the tight side. When the boxes are together they are free to move slightly. No doubt when the molders close the molds they intend to let the pins enter their lugs with a bearing all on one side, brought about by a twisting movement exerted on the descending box, and doubtless various other little tricks are employed to secure an approximation to truth. But if pins and holes are parallel and concentric, and it is a simple shop job to make them so, each pin might have a play of, say 0.01 inch, just at closing only, and the molds would be substantially and sufficiently true in position every time.

"The truth is that the art of molding and casting is too haphazard. Too much is assumed as to the stock-removing powers of the machine shop, and it has become an ingrained conviction, a veritable mental attitude, that castings are necessarily rough and inaccurate. This was the mental attitude that I no doubt ran against. Wherever one goes, one encounters the fact that the foundry lags be-

hind the rest of the works, and to some extent so does the pattern shop. The pattern shop does not intend to shoulder the blame for an occasional case of short stock, so it makes things big enough and leaves them to the big planer or the lathe to deal with. For every dollar saved by not making things too small now and again the pattern shop involves the machine shop in many dollars' outlay. If patternmakers and molders would set themselves to do it, they might considerably reduce the work of the machine shop. Molding and casting should not be looked upon as a mere haphazard game, but as an art possessing great possibilities of accuracy, as it already requires good judgment.

The molder's flask is so essentially near the foundation of the art that it ought to be a good piece of work in itself, the halves meeting without rock and without possibility of lateral displacement. In machine molding accurate flasks are employed, and indeed must be by the very nature of the operation. There is equal reason for asking that all flasks be truly fitted. It should be considered as irrational for a founder to lay bad work on his faulty boxes as for a mason to excuse his bad work because his square contained an angle of 89 degrees instead of the fourth part of a circle.

The Erie Foundry Foremen's Association.

Especially in the large foundry centers the foundry foremen should find advantages in meeting occasionally and discussing such questions as arise from time to time in each locality. The foremen of Erie, Pa., have formed a local association, the objects of which are set forth in its constitution as follows:

"It shall be the object of this society to promote the advancement of the foundry interests in the city of Erie, Pa. To endeavor to have more uniform systems of management, customs and discipline prevail among all foundries; to encourage thought on scientific and mechanical matters, and the mechanical and scientific advancement of the art of molding and founding in their several branches; to collect for the use of the society all proper information relative to the art of molding, the operation of foundries, their management or anything connected with the foundry business; to strive to have a more just and equitable system of apprenticeship prevail in all shops with which we are or may be connected to the end that we may lend our best efforts towards the making of better and more intelligent molders and coremakers, and to as soon as possible establish a night school for the technical instruction of foundry apprentices in the city."

The officers are: President, W. F. Grunau, Erie City Iron Works; vice-president, Chas. Urick, Walker Foundry Co.; secretary, H. E. Kies, Erie Malleable Iron Co.; treasurer, A. K. Acheson, South Erie Iron Works.

Core Boxes for Globe Valves.

I have read Mr. Wagner's article in your May issue dealing with this subject, and am not greatly impressed with his method of handling it. I have had nearly twenty years' experience in foundry work, and during this time have seen all sorts of core boxes for globe valves. The best that ever came under my notice, and the one which brought the best all-around results, is one in which the core is made in two pieces, which requires two boxes, one right and one left. The cores are made solid by two wires in each half, so placed that they both pass through the valve seat, thus amply securing the only weak part of the core. By this method any straight core plate will answer, and the cores are easily pasted, a slight mark with the heel of a slick carries off the vent. The question of getting the cores in the mold right is a simple matter; globe valves go in pairs and if the order is for a hundred valves set the first fifty with the ball toward the flange and the other fifty away from it. In this way there can be but very few mistakes, and I think this is one good way of making the core. I have seen the plan tried of making the whole core in one piece, but it is impossible to secure the valve seat, and they are too apt to break at this point, besides requiring too much time in making them. The core maker with a half box can make two cores against one by the former method. WILLIAM C. SISSON.

Two Old Foundries.

In the pleasant village of Easton, Mass., are two foundries, one of which dates back to colonial times. This is at the present time owned by Lincoln S. Drake, and sixty or more years ago this place was one of the leading foundries in New England—a regular university, so to speak, with branch foundries in several towns.

The Belcher Malleable Iron Co. is another of Easton's old institutions, of which Mr. Daniel Belcher became the sole owner more than half

a century ago. It has had uninterrupted success, never shutting down in all this time except once, when it was burned, and even then all hands were kept at work. At this time many inducements were offered Mr. Belcher to locate elsewhere to which he replied that his employes had built their homes in Easton and relied on the foundry for employment and that he deemed it his duty not to disappoint them. The relations which existed between employer and employes at that time may be judged from the fact that Mr. Belcher, being the leader of the old Fourth Regiment Brass Band, and having twelve or more members of the band working in the foundry, was often heard to say during the noon hour: "Bring down your instruments this afternoon, we must try that new piece."

When a young man entered the employ of this company he was looked upon as settled for life, yet, many left to take charge of other foundries. My father worked in this shop, I served a four years' apprenticeship therein, and two of my sons also learned their trade in the same place. It is the same to this day—father, sons and grandsons working in the old foundry. At the present time two brothers compose the company, both practical workmen in all departments, W. T. Belcher acting as superintendent and George C. Belcher as business manager.

PATRICK SHIELDS.

Producing a Black Color on Brass.

Much difficulty is often experienced by platers and other brass workers in the production of a satisfactory black color on brass. This would, perhaps, appear somewhat ridiculous inasmuch as brass will of its own accord oxidize to a black color if left for any length of time. Oxidized silver, which was much in vogue at one time, greatly stimulated the production of a similar finish on brass, and the same method was employed, but usually with unsatisfactory results. In the oxidation of silver the property of tarnishing by sulphur compounds is made use of, as the ready susceptibility of this metal to such influences is sufficient to render the process quite satisfactory. Silver is very easily blackened by sulphur and its compounds, and all that is necessary to do is to bring it in contact with a solution of potassium or sodium sulphide (liver of sulphur), when an immediate blackening takes place. The same method used on brass produces a black color, but not entirely satisfactory, as it is wanting both in color and in depth. If allowed to remain for a long time, in order to obtain a deep black, the coating does not appear to adhere, but scales off. These difficulties render the employment of sulphur compounds in blackening brass more or less unsatisfactory, and much trouble is found in their use. Those who have attempted their use have usually abandoned the method in favor of others.

The solution now generally employed for the production of a black or oxidized surface on brass is a solution of carbonate of copper in ammonia. The work is then immersed in it and allowed to remain until the required tint is produced. The carbonate of copper is best used in the so-called plastic condition, as it is then much more easily dissolved. Plastic carbonate of copper may be purchased, but if one wishes to make it the following method answers well. Make a solution of blue vitriol (sulphate of copper) in hot water, and add a strong solution of common washing soda to it as long as any precipitate forms. The precipitate is allowed to settle and the clear liquid poured off. Hot water is now added, and the mass stirred and again allowed to settle. Again the clear liquid is poured off, and the operation of adding water, settling and pouring off repeated. This is continued until everything has been washed out of the green carbonate of copper, which remains in the bottom of the vessel. Six or eight times is usually sufficient to remove the impurities. After the water has been removed during the last pouring and nothing is left but an emulsion of the thick plastic carbonate in a small quantity of water, liquid ammonia is added until everything is dissolved and a clear, deep blue liquid is produced. If too strong, water may be added, but I have found that a strong solution works better than a weak one. If it is desired to make the solution from commercial plastic carbonate of copper, the following directions may be followed: Dissolve 1 pound of the plastic carbonate of copper in 2 gallons of strong ammonia. This gives the required strength of solution.

The brass, which it is desired to blacken, is first boiled in a strong potash solution to remove grease and oil, then well rinsed and dipped in the copper solution, which has previously been heated from 150 to 175 degrees Fahrenheit. The solution does not work well cold, and if heated too hot gives off all of the ammonia. The brass is left in the solution

until the required tint is produced. The color produced is very uniform and black. It also holds tenaciously and does not readily peel off. After the desired color is produced the brass is rinsed and dried in sawdust. A great variety of effects may be produced by first finishing the brass before blackening, as the oxidizing process does not injure the texture of the metal at all. A very satisfactory finish is produced by first rendering the surface of the brass matt, either by scratch brush or similar methods, as the black finish thus produced by the copper solution is then dead—one of the most pleasing effects of an oxidized surface. Various effects may also be produced by coloring the entire article and then buffing off the exposed portions.

The best results in the use of this solution are obtained by the use of the so-called red metals, i. e., those in which the copper predominates. The reason for this is quite obvious. Ordinary sheet brass consists of about 2 parts of copper and 1 part of zinc, so that the large quantity of the latter somewhat hinders the production of a deep black surface. Yellow brass is colored black by means of the solution, but if the very best results are desired it is well to use some metal having a reddish tint, indicating the presence of a large amount of copper. The varieties of sheet brass, known as gilding or bronze, work well. Copper also gives excellent results. Where the best results are desired on yellow brass a very light electro-plate of copper before the oxidizing works well and gives an excellent black. With the usual articles made of yellow brass, however, this is rarely done, but the oxidization carried out directly.—Erwin S. Sperry, in *The Metal Industry*.

Fires.

The plant of the Love Mfg. Co., Corry, Pa., was badly damaged in a fire April 29.

McCarthy & Malinski's foundry, at Cairo, Ill., was destroyed by fire May 1.

The foundry of D. R. Sperry & Co., at North Aurora, Ill., burned April 26.

The foundry connected with the Whittier Machine Co., Boston, Mass., burned April 21.

The Pyott Foundry Co., of Chicago, suffered considerable loss through a fire at its plant April 18.

Fire visited the plant of the Union Foundry & Machine Co., Birmingham, Ala., May 4, and did considerable damage.

Notes From Various Sources.

The American Brass & Pipe Co. has been formed at Connellsville, Pa., to take over the plant of the Crescent Mfg. Co.

The Whiting Foundry Equipment Co., of Harvey, Ill., has increased its capital stock to $400,000.

The Lippold Valve Co., Erie, Pa., will erect a foundry and machine shop.

The Vulcan Facing Co., of Easton, Pa., has placed its new plant in operation. This is equipped with modern machinery throughout, and will produce a full line of high grade facings.

The plant of the Charleston Foundry Co., Charleston, Ill., will be removed to Mattoon, Ill. The company manufactures stoves.

The S. Obermayer Co. has increased the capacity of its Chicago plant nearly fifty per cent to meet the demands of its Western trade.

The Star Foundry Co. has been incorporated at St. Louis, Mo., to do a general foundry business, by A. T. Niehaus, R. L. Riehl, G. A. Krag and R. Gordon.

J. Gilmour, Bennett Bldg., New York, has issued a catalogue covering all forms of foundry equipment. This will be mailed free to those who ask for it.

The Star Machine Co., Star, N. C., recently incorporated with a capital stock of $10,000, have equipped a plant for general machine and foundry work. The officers are: Ernest Leach, president; John L. Tull, vice president; G. N. Scarboro, secretary and treasurer, and John T. Jenkins, manager.

The Ingersoll-Sergeant Drill Co., of New York, has issued a pamphlet describing the Air Hammers manufactured by the Haeseler-Ingersoll Pneumatic Tool Co., of which it is the general selling agent. These possess several new features, making them different from other tools of a similar character. Descriptive circular may be had upon application.

The Mansfield Mfg. Co., of Pittsburg, has been absorbed by the Bailey-Farrell Mfg. Co. The latter concern has a paid up capital of $300,000 and the following officers: George H. Bailey, president; George R. Acheson, formerly of the Mansfield Mfg. Co., general manager; John W. Garland, vice president, and Robert Garland and Charles G. Noble, directors.

From Henry E. Pridmore, of Chicago, we have received a neat catalogue describing many of the different types of molding machines made by him. In addition to general data

there is also included much useful information dealing with methods of mounting patterns, flasks and the comparative cost of machine molding, as against making the same casting by hand, gathered from actual performances. Copies of this catalogue will be mailed to interested parties upon request.

The Columbia Boiler & Foundry Co., of Indianapolis, Ind., has been organized with a capital stock of $75,000 by Geo. S. Row, Thos. C. Rutledge, O. M. Simmons, H. W. Hopkins and A. J. Simmons.

The Millett Core Oven Co., Brightwood, Mass., has issued a new catalogue dealing with the Millett Core Oven, which it will mail anywhere, free of charge.

The American Foundry Co. has been incorporated at Toledo, O., by C. H. Mills, Elmer Gerson, D. J. Nyswander, M. V. Wolf and B. F. Long. The capital stock is $10,000.

The R. Mackellar's Sons Co., of Peekskill, N. Y., manufacturer of facings, has decided to double the capacity of its plant and to make other improvements.

The American Foundry Co., of Columbus, Ind., has been incorporated with a capital stock of $10,000. The directors are: Marshall P. Reeves, Milton O. Reeves, Girnie L. Reeves, Daniel McNeil and Gideon Batton.

In Bulletin No. 13, Pawling & Harnischfeger, Milwaukee, Wis., call attention to types of traveling electric hoists built by them and the facility with which different parts of works can be covered by these machines. Many illustrations of interesting installations are shown in this bulletin, of which copies will be mailed upon application.

Under the name of the South Baltimore Steel Car & Foundry Co., with an authorized capital of $1,000,000, it is proposed to consolidate the interests of the Ryan-McDonald Mfg. Co., the South Baltimore Car Works and the South Baltimore Foundry, all of Baltimore, Md. The South Baltimore Car Works now makes wooden cars, and an important addition will be the manufacture of steel cars. It has a capital of $300,000. The Ryan & McDonald Mfg. Co. has a capital of $125,000 and makes contractors' machinery and supplies. The South Baltimore Foundry has a capital of $50,000 and turns out gray iron castings. The three industries are situated at Curtis Bay, and it is believed the merger, with additional capital, will provide better facilities for handling the extensive business.

Touching upon the care of pneumatic hammers the Chicago Pneumatic Tool Co. says in a circular recently issued to the trade:

"Pneumatic hammers like all other classes of machinery must receive proper care and lubrication in order to give proper results, therefore, one of the most important factors connected with their care is to keep them clean and well lubricated.

"As the air taken into the compressor generally contains some particles of grit and dust it is almost impossible to prevent this foreign matter from entering into the working parts of the hammer, causing the ports to become clogged and rendering it inoperative. The use of a poor grade or heavy bodied oil will also cause the same trouble. A good plan to follow in such cases is to clean by using benzine freely through the throttle handle. This dislodges all foreign matter and cuts the thick oil which can then be removed by blowing the air through the hammer.

"It is an excellent plan to submerge the hammer occasionally over night in a bath of kerosene and then blow out under pressure the following morning, and lubricate with a good quality of light machine oil or better still, our special Airoilene, which is manufactured especially for use with pneumatic tools. This not only materially assists in prolonging the life of the tool, but it will also be found to give better results.

"Where the air is unusually laden with foreign matter we would recommend the use of strainers or filters to be attached to the tool or placed in the supply pipe as the case may be."

The F. C. Patton Co., of Sycamore, Ill., is about to commence the erection of a new foundry measuring 70 x 200 feet.

The American Air Compressor Works, 26 Cortland St., New York, have issued for gratuitous distribution a complete catalogue illustrating and describing the many types of the American air compressors, air receivers, vacuum pumps, carbonic acid gas and high pressure compressors, and the American air lift pumping system. Among the other contents of this catalogue will be found information relative to pneumatic tools, and a table showing the flow of air through various size orifices.

Farmers in the vicinity of Hainesport are becoming wealthy from the sale of molding sand found there, which is used in iron foundries. Hitherto these farms have been practically worthless.—Hoboken (N. J.) *Observer.*